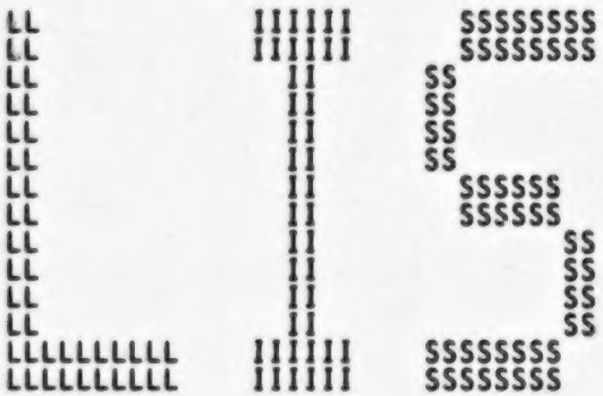
```
DDDDDDDDDDD     EEEEEEEEEEEEEEE  BBBBBBBBBBB      UUU         UUU     GGGGGGGGGGG
DDDDDDDDDDDD    EEEEEEEEEEEEEEE  BBBBBBBBBBBB     UUU         UUU     GGGGGGGGGGG
DDDDDDDDDDDD    EEEEEEEEEEEEEEE  BBBBBBBBBBBB     UUU         UUU     GGGGGGGGGGG
DDD         DDD EEE              BBB         BBB  UUU         UUU GGG
DDD         DDD EEE              BBB         BBB  UUU         UUU GGG
DDD         DDD EEE              BBB         BBB  UUU         UUU GGG
DDD         DDD EEE              BBB         BBB  UUU         UUU GGG
DDD         DDD EEE              BBB         BBB  UUU         UUU GGG
DDD         DDD EEEEEEEEEEE      BBBBBBBBBBBB     UUU         UUU GGG
DDD         DDD EEEEEEEEEEE      BBBBBBBBBBBB     UUU         UUU GGG
DDD         DDD EEEEEEEEEEE      BBBBBBBBBBBB     UUU         UUU GGG
DDD         DDD EEE              BBB         BBB  UUU         UUU GGG    GGGGGGGGG
DDD         DDD EEE              BBB         BBB  UUU         UUU GGG    GGGGGGGGG
DDD         DDD EEE              BBB         BBB  UUU         UUU GGG    GGGGGGGGG
DDD         DDD EEE              BBB         BBB  UUU         UUU GGG          GGG
DDD         DDD EEE              BBB         BBB  UUU         UUU GGG          GGG
DDD         DDD EEE              BBB         BBB  UUU         UUU GGG          GGG
DDDDDDDDDDDD    EEEEEEEEEEEEEEE  BBBBBBBBBBBB     UUUUUUUUUUUUUUU     GGGGGGGGG
DDDDDDDDDDDD    EEEEEEEEEEEEEEE  BBBBBBBBBBBB     UUUUUUUUUUUUUUU     GGGGGGGGG
DDDDDDDDDDDD    EEEEEEEEEEEEEEE  BBBBBBBBBBBB     UUUUUUUUUUUUUUU     GGGGGGGGG
```

FILEID**DBGLANVEC



```
;     1          0001  0 MODULE DBGLANVEC (IDENT = 'V04-000') =
;     2          0002  0
;     3          0003  1 BEGIN
;     4          0004  1 !
;     5          0005  1 !**************************************************************************
;     6          0006  1 !*                                                                        *
;     7          0007  1 !*  COPYRIGHT (c) 1978, 1980, 1982, 1984 BY                              *
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;    21          0021  1 !*                                                                        *
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;    24          0024  1 !*                                                                        *
;    25          0025  1 !*                                                                        *
;    26          0026  1 !**************************************************************************
;    27          0027  1 !
;    28          0028  1 !
;    29          0029  1 ! WRITTEN BY
;    30          0030  1 !       Bruce Olsen     July, 1980
;    31          0031  1 !
;    32          0032  1 ! REWRITTEN BY
;    33          0033  1 !       Rich Title      July, 1983
;    34          0034  1 !
;    35          0035  1 ! MODULE FUNCTION
;    36          0036  1 !       This module contains several miscellaneous routines for
;    37          0037  1 !       manipulating descriptors. The name of the module is a holdover
;    38          0038  1 !       from the days when each language had its own Primary and Value
;    39          0039  1 !       Descriptors. At that time, this module had routines which
;    40          0040  1 !       did a CASE on the language, and called the appropriate language
;    41          0041  1 !       routine. Now that we have common Primary and Value descriptors
;    42          0042  1 !       for all languages, this is no longer necessary. But the routines
;    43          0043  1 !       for copying descriptors, deleting descriptors, and so on,
;    44          0044  1 !       still reside in this module.
;    45          0045  1 !
;    46          0046  1 !
;    47          0047  1 ! MODIFIED BY
;    48          0048  1 !       R. Title        Aug 1982        Put in code to check for implementationm
;    49          0049  1 !                                       level = 3, so that we can test new support
;    50          0050  1 !                                       for PASCAL, PLI, and COBOL.
;    51          0051  1 !       R. Title        Aug 1982        Added comments to each routine so that
;    52          0052  1 !                                       the description now says what the routine
;    53          0053  1 !                                       does, instead of just saying "see the
;    54          0054  1 !                                       language-specific routines".
;    55          0055  1 !       R. Title        Mar 1983        Removed all of the "level 2" PASCAL,
;    56          0056  1 !                                       PL/I and COBOL code.
;    57          0057  1 !
```

```
;    58          0058  1 REQUIRE 'SRC$:DBGPROLOG.REQ';
;    59          0192  1
;    60          0193  1 FORWARD ROUTINE
;    61          0194  1     DBG$NGET_LVAL,
;    62          0195  1     DBG$NGET_TYPE,
;    63          0196  1     DBG$NMAKE_VAL_DESC,
;    64          0197  1     DBG$NTYPE_CONV,
;    65          0198  1     DBG$NSYMBOLIZE,
;    66          0199  1     DBG$NGET_PAGES,
;    67          0200  1     DBG$NGET_LENGTH,
;    68          0201  1     DBG$NCOPY_DESC,
;    69          0202  1     COPY_DESC_HANDLER,
;    70          0203  1     DBG$NFREE_DESC,
;    71          0204  1     DBG$NGET_SYMID,
;    72          0205  1     DBG$NINITIALIZE: NOVALUE;
```

```
;    74          0206  1 EXTERNAL ROUTINE
;    75          0207  1     DBG$DATA_LENGTH,                ! Obtain length from VMS descriptor
;    76          0208  1     DBG$EVAL_LANG_OPERATOR,         ! Evaluate operator expressions in
;    77          0209  1                                     !     current language
;    78          0210  1     DBG$GET_MEMORY,                 ! Allocate permanent memory
;    79          0211  1     DBG$GET_TEMPMEM,                ! Allocate temporary memory
;    80          0212  1     DBG$MAKE_VMS_DESC,              ! Convert Primary Descriptor to
;    81          0213  1                                     !     VMS descriptor
;    82          0214  1     DBG$PRIM_TO_VAL,                ! Convert Primary Descriptor to
;    83          0215  1                                     !     Value Descriptor
;    84          0216  1     DBG$PRINT_AGGREGATE: NOVALUE,   ! Output an aggregate object
;    85          0217  1     DBG$PRINT_IDENTIFIER,           ! Replacement for DBG$NSYMBOLIZE -
;    86          0218  1                                     !     prints an identifier.
;    87          0219  1     DBG$PRINT_VALUE: NOVALUE,       ! Print a value descriptor.
;    88          0220  1     DBG$REL_MEMORY: NOVALUE;        ! Release memory
;    89          0221  1
;    90          0222  1 EXTERNAL
;    91          0223  1     DBG$GB_LANGUAGE : BYTE,         ! Language code for current language
;    92          0224  1     DBG$GL_CONVERT_TOKEN,           ! Pointer to CONVERT token
;    93          0225  1     DBG$GL_DEPOSIT_TOKEN;           ! Pointer to DEPOSIT token
;    94          0226  1
;    95          0227  1 LITERAL
;    96          0228  1     MIN_LANGUAGE_CODE = MIN (DBG$K_PLI, DBG$K_PASCAL, DBG$K_COBOL),
;    97          0229  1     MAX_LANGUAGE_CODE = MAX (DBG$K_PLI, DBG$K_PASCAL, DBG$K_COBOL);
;    98          0230  1
;    99          0231  1 OWN
;   100          0232  1         COPY_DESC_HEAD;             ! Points to the header of a copied descriptor,
;   101          0233  1                                     ! if we are copying the descriptor into
;   102          0234  1                                     ! permanent memory. This is used by
;   103          0235  1                                     ! COPY_DESC_HANDLER.
;   104          0236  1
```

```
;  106     0237  1 GLOBAL ROUTINE DBG$NGET_LVAL (PRIM_DESC, PARAM2, PARAM3) =
;  107     0238  1 !
;  108     0239  1 ! FUNCTIONAL DESCRIPTION:
;  109     0240  1 !
;  110     0241  1 !       Obtains a symbol's lvalue using the primary descriptor for that
;  111     0242  1 !       symbol. Note that most types of named constants do not have an
;  112     0243  1 !       lvalue. The debugger gives special treatment to named constants
;  113     0244  1 !       which have read only memory allocated to contain their value.
;  114     0245  1 !
;  115     0246  1 !       This routine is still called from DBGEXC,
;  116     0247  1 !       in the process of displaying "old value", "new value" on watchpoints.
;  117     0248  1 !       This routine can thus go away when DBGEXC is replaced by DBGEVENT.
;  118     0249  1 !
;  119     0250  1 ! FORMAL PARAMETERS:
;  120     0251  1 !
;  121     0252  1 !       prim_desc       - A longword which contains the address of a primary descriptor
;  122     0253  1 !
;  123     0254  1 !       param2          - The address of a quadword to contain the lvalue of the
;  124     0255  1 !                         entity described by the primary descriptor and the bit
;  125     0256  1 !                         offset, if any. The byte address will be contained in
;  126     0257  1 !                         in the first longword, the bit offset in the second
;  127     0258  1 !                         longword.
;  128     0259  1 !
;  129     0260  1 !       param3          - The address of a longword to contain the address of
;  130     0261  1 !                         a message argument vector as described on page 4-119
;  131     0262  1 !                         of the VAX/VMS system reference, volume 1A
;  132     0263  1 !
;  133     0264  1 ! IMPLICIT INPUTS:
;  134     0265  1 !
;  135     0266  1 !       NONE
;  136     0267  1 !
;  137     0268  1 ! IMPLICIT OUTPUTS:
;  138     0269  1 !
;  139     0270  1 !       NONE
;  140     0271  1 !
;  141     0272  1 ! ROUTINE VALUE:
;  142     0273  1 !
;  143     0274  1 !       An unsigned longword integer completion code
;  144     0275  1 !
;  145     0276  1 ! COMPLETION CODES:
;  146     0277  1 !
;  147     0278  1 !       STS$K_SUCCESS (1) - Success. The object described by the input primary
;  148     0279  1 !                           descriptor has an lvalue which is being returned.
;  149     0280  1 !
;  150     0281  1 !       STS$K_ERROR   (2) - Failure. Object does not have an lvalue.
;  151     0282  1 !
;  152     0283  1 ! SIDE EFFECTS:
;  153     0284  1 !
;  154     0285  1 !       NONE
;  155     0286  1 !
;  156     0287  1 !
;  157     0288  2     BEGIN
;  158     0289  2
;  159     0290  2     MAP
;  160     0291  2         PRIM_DESC : REF DBG$PRIMARY;    ! Points to a new style Primary
;  161     0292  2                                         ! Descriptor.
;  162     0293  2
```

```
;  163          0294  2     LOCAL
;  164          0295  2         VMS_DESC: REF DBG$STG_DESC,
;  165          0296  2         VMS_DESC_AREA: DBG$STG_DESC;
;  166          0297  2
;  167          0298  2
;  168          0299  2     IF .PRIM_DESC [DBG$B_DHDR_TYPE] EQL DBG$K_PRIMARY_DESC
;  169          0300  2     THEN
;  170          0301  2         BEGIN
;  171          0302  2
;  172          0303  2         ! Set up the VMS descriptor.
;  173          0304  2         !
;  174          0305  2         VMS_DESC = VMS_DESC_AREA;
;  175          0306  2
;  176          0307  2         ! Call the routine that fills in the VMS descriptor.
;  177          0308  2         !
;  178          0309  2         DBG$MAKE_VMS_DESC (.PRIM_DESC, .VMS_DESC);
;  179          0310  2         END
;  180          0311  2
;  181          0312  2     ! Value descriptor or volatile value descriptor - we already
;  182          0313  2     ! have a VMS descriptor.
;  183          0314  2     !
;  184          0315  2     ELSE IF .PRIM_DESC [DBG$B_DHDR_TYPE] EQL DBG$K_VALUE_DESC
;  185          0316  2     OR .PRIM_DESC [DBG$B_DHDR_TYPE] EQL DBG$K_V_VALUE_DESC
;  186          0317  2     THEN
;  187          0318  2         VMS_DESC = PRIM_DESC [DBG$A_VALUE_VMSDESC]
;  188          0319  2
;  189          0320  2     ! We do not expect any other kind of descriptor.
;  190          0321  2     !
;  191          0322  2     ELSE
;  192          0323  2         $DBG_ERROR ('DBGLANVEC\DBG$NGET_LVAL unknown descriptor kind');
;  193          0324  2
;  194          0325  2     ! Fill in the output parameter to point to the
;  195          0326  2     ! (byte address, bit offset) quadword in the VMS descriptor.
;  196          0327  2     !
;  197          0328  2     .PARAM2     = .VMS_DESC[DSC$A_POINTER];
;  198          0329  2     .PARAM2 + 4 = .VMS_DESC[DSC$L_POS];
;  199          0330  2     RETURN STS$K_SUCCESS;
;  200          0331  1     END;


                                                                .TITLE  DBGLANVEC
                                                                .IDENT  \V04-000\

                                                                .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

24 47 42 44 5C 43 45 56 4E 41 4C 47 42 44 2F  00000 P.AAA:     .ASCII  \/DBGLANVEC\<92>\DBG$NGET_LVAL unknown d\   ;
6F 6E 6B 6E 75 20 4C 41 56 4C 5F 54 45 47 4E  0000F                                                            ;
                                              64 20 6E 77     0001E                                            ;
   64 6E 69 6B 20 72 6F 74 70 69 72 63 73 65  00022           .ASCII  \escriptor kind\                         ;

                                                                .PSECT  DBG$OWN,NOEXE,  PIC,2

                                                00000 COPY_DESC_HEAD:
                                                                .BLKB   4

                                                                .EXTRN  DBG$DATA_LENGTH
                                                                .EXTRN  DBG$EVAL_LANG_OPERATOR
```

```
                                                        .EXTRN  DBG$GET_MEMORY, DBG$GET_TEMPMEM
                                                        .EXTRN  DBG$MAKE_VMS_DESC
                                                        .EXTRN  DBG$PRIM_TO_VAL
                                                        .EXTRN  DBG$PRINT_AGGREGATE
                                                        .EXTRN  DBG$PRINT_IDENTIFIER
                                                        .EXTRN  DBG$PRINT_VALUE
                                                        .EXTRN  DBG$REL_MEMORY, DBG$GB_LANGUAGE
                                                        .EXTRN  DBG$GL_CONVERT_TOKEN
                                                        .EXTRN  DBG$GL_DEPOSIT_TOKEN

                                                        .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                                0004 00000      .ENTRY  DBG$NGET_LVAL, Save R2                  ; 0237
                                             5E         0C  C2 00002      SUBL2   #12, SP                         ;
00000079  8F     04  BC                     08  10  ED 00005      CMPZV   #16, #8, @PRIM_DESC, #121               ; 0299
                                                11  12 0000F      BNEQ    1$                                      ;
                                             52         6E  9E 00011      MOVAB   VMS_DESC_AREA, VMS_DESC         ; 0305
                                                52  DD 00014      PUSHL   VMS_DESC                                ; 0309
                                          04    AC  DD 00016      PUSHL   PRIM_DESC                               ;
                 00000000G   00                 02  FB 00019      CALLS   #2, DBG$MAKE_VMS_DESC                   ;
                                                34  11 00020      BRB     4$                                      ; 0299
0000007A  8F     04  BC                     08  10  ED 00022 1$:  CMPZV   #16, #8, @PRIM_DESC, #122              ; 0315
                                                0C  13 0002C      BEQL    2$                                      ;
00000083  8F     04  BC                     08  10  ED 0002E      CMPZV   #16, #8, @PRIM_DESC, #131              ; 0316
                                                07  12 00038      BNEQ    3$                                      ;
                 52      04  AC                14  C1 0003A 2$:  ADDL3   #20, PRIM_DESC, VMS_DESC               ; 0318
                                                15  11 0003F      BRB     4$                                      ;
                                 00000000'      EF  9F 00041 3$:  PUSHAB  P.AAA                                   ; 0323
                                                01  DD 00047      PUSHL   #1                                      ;
                                 00028362       8F  DD 00049      PUSHL   #164706                                 ;
                 00000000G   00                 03  FB 0004F      CALLS   #3, LIB$SIGNAL                          ;
                             50      08  AC    D0  00056 4$:  MOVL    PARAM2, R0                              ; 0328
                             60      04  A2    7D  0005A      MOVQ    4(VMS_DESC), (R0)                       ;
                             50          01    D0  0005E      MOVL    #1, R0                                  ; 0330
                                                04  00061      RET                                             ; 0331

; Routine Size:  98 bytes,    Routine Base:  DBG$CODE + 0000
```

```
;  202     0332  1 GLOBAL ROUTINE DBG$NGET_TYPE (PRIM_DESC, PARAM2, PARAM3) =
;  203     0333  1 !
;  204     0334  1 ! FUNCTIONAL DESCRIPTION:
;  205     0335  1 !
;  206     0336  1 !       Uses a symbol's primary descriptor to return type information. The
;  207     0337  1 !       types recognized are limited to three:
;  208     0338  1 !
;  209     0339  1 !       1)      - type named constant and instruction
;  210     0340  1 !                 (lexical entities, labels)
;  211     0341  1 !
;  212     0342  1 !       2)      - type named constant and
;  213     0343  1 !                 noinstruction (symbolic literals)
;  214     0344  1 !
;  215     0345  1 !       3)      - type other
;  216     0346  1 !
;  217     0347  1 !       This routine is still called from DBGEXC.
;  218     0348  1 !       It can go away when we convert over to the new DBGEVENT.
;  219     0349  1 !
;  220     0350  1 ! FORMAL PARAMETERS:
;  221     0351  1 !
;  222     0352  1 !       prim_desc       - A longword containing the address of a primary descriptor
;  223     0353  1 !
;  224     0354  1 !       param2          - The address of a longword to contain an unsigned integer
;  225     0355  1 !                         encoding of the symbol's type as follows:
;  226     0356  1 !
;  227     0357  1 !               dbg$k_nc_instruction (125)      - named constant, instruction
;  228     0358  1 !
;  229     0359  1 !               dbg$k_nc_other (126)            - named constant, noinstruction
;  230     0360  1 !
;  231     0361  1 !               dbg$k_other (127)               - other
;  232     0362  1 !
;  233     0363  1 !       param3          - The address of a longword to contain the address of
;  234     0364  1 !                         a message argument vector as described on page 4-119
;  235     0365  1 !                         of the VAX/VMS system reference, volume 1A
;  236     0366  1 !
;  237     0367  1 ! IMPLICIT INPUTS:
;  238     0368  1 !
;  239     0369  1 !       NONE
;  240     0370  1 !
;  241     0371  1 ! IMPLICIT OUTPUTS:
;  242     0372  1 !
;  243     0373  1 !       In case of a severe error return, a message argument vector is constructed
;  244     0374  1 !       from dynamic storage and returned.
;  245     0375  1 !
;  246     0376  1 ! ROUTINE VALUE:
;  247     0377  1 !
;  248     0378  1 !       An unsigned integer longword completion code
;  249     0379  1 !
;  250     0380  1 ! COMPLETION CODES:
;  251     0381  1 !
;  252     0382  1 !       STS$K_SUCCESS (1) - Success. Type information recovered and returned.
;  253     0383  1 !
;  254     0384  1 !       STS$K_SEVERE  (4) - Failure. No type information recovered. Message
;  255     0385  1 !                           argument vector constructed and returned.
;  256     0386  1 !
;  257     0387  1 ! SIDE EFFECTS:
;  258     0388  1 !
```

```
;  259          0389  1 !       NONE
;  260          0390  1 !
;  261          0391  2     BEGIN
;  262          0392  2
;  263          0393  2     ! For now, always return "OTHER". This may not be completely
;  264          0394  2     ! correct - we will fix it up later.
;  265          0395  2     !
;  266          0396  2     .PARAM2 = DBG$K_OTHER;
;  267          0397  2     RETURN STS$K_SUCCESS;
;  268          0398  1     END;


                                    0000 00000          .ENTRY  DBG$NGET_TYPE, Save nothing                     ; 0332
                         08   BC    7F   8F   9A 00002  MOVZBL  #127, @PARAM2                                   ; 0396
                              50         01   D0 00007  MOVL    #1, R0                                          ; 0397
                                              04 0000A  RET                                                     ; 0398

; Routine Size:  11 bytes,    Routine Base:  DBG$CODE + 0062
```

```
;  270     0399  1 GLOBAL ROUTINE DBG$NMAKE_VAL_DESC (PRIM_DESC, PARAM2, PARAM3, PARAM4) =
;  271     0400  1 !
;  272     0401  1 !++
;  273     0402  1 ! FUNCTIONAL DESCRIPTION:
;  274     0403  1 !
;  275     0404  1 !       Translates language specific primary descriptors to language specific
;  276     0405  1 !       value descriptors. This routine should be able to use the symbol table
;  277     0406  1 !       access routines and the information contained within the primary descriptor
;  278     0407  1 !       to construct a descriptor which represents a 'value materialization' for
;  279     0408  1 !       the object represented by the input primary descriptor.
;  280     0409  1 !
;  281     0410  1 !       Note that this routine must be able to use life-time, invocation, and
;  282     0411  1 !       generation information to produce an accurate value descriptor of the
;  283     0412  1 !       input object, or to decide when the value of an object cannot be
;  284     0413  1 !       materialized (such as when the user's PC is not within the scope of
;  285     0414  1 !       a dynamic variable).
;  286     0415  1 !
;  287     0416  1 !       Value descriptors produced by this routine must be marked (within the
;  288     0417  1 !       type field of the language independent header block) as to whether
;  289     0418  1 !       they are non-volatile (dsc$k_value_desc) or volatile (dsc$k_v_value_desc).
;  290     0419  1 !       Volatile value descriptors will NOT be stored to represent '\', 'last value'.
;  291     0420  1 !
;  292     0421  1 !       Since value descriptors may be used as target descriptors ( as input to
;  293     0422  1 !       dbg$npli_type_conv ), some provision must be made for incorporating
;  294     0423  1 !       a value pointer field within the value descriptor. This type of value
;  295     0424  1 !       descriptor is loosely defined as a volatile type.
;  296     0425  1 !
;  297     0426  1 !       This routine is still called from DBGEXC in the process of giving
;  298     0427  1 !       watchpoint display. It can thus go away when DBGEXC is replaced
;  299     0428  1 !       by DBGEVENT.
;  300     0429  1 !
;  301     0430  1 !       This routine call a language-specific routine based on the language
;  302     0431  1 !       code in the descriptor header.
;  303     0432  1 !
;  304     0433  1 ! FORMAL PARAMETERS:
;  305     0434  1 !
;  306     0435  1 !       prim_desc       - A longword containing the address of a primary descriptor
;  307     0436  1 !
;  308     0437  1 !       param2          - A longword containing boolean true or false. When true,
;  309     0438  1 !                         the caller is requesting the construction of a value
;  310     0439  1 !                         descriptor that can be used as a target descriptor for
;  311     0440  1 !                         the type converter. The resulting value must therefore
;  312     0441  1 !                         contain a pointer to the value of the entity described
;  313     0442  1 !                         by the input primary descriptor. Presumably, such a
;  314     0443  1 !                         value descriptor will be of volatile type.
;  315     0444  1 !
;  316     0445  1 !       param3          - The address of a longword to contain the address of the
;  317     0446  1 !                         resulting value descriptor
;  318     0447  1 !
;  319     0448  1 !       param4          - The address of a longword to contain the address of a
;  320     0449  1 !                         message argument vector as described on page 4-119 of
;  321     0450  1 !                         the VAX/VMS system reference, volume 1A
;  322     0451  1 !
;  323     0452  1 ! IMPLICIT INPUTS:
;  324     0453  1 !
;  325     0454  1 !       Depends on the language-specific routine.
;  326     0455  1 !
```

```
;  327          0456  1 ! IMPLICIT OUTPUTS:
;  328          0457  1 !
;  329          0458  1 !       In case of a success return, the resulting value descriptor must be
;  330          0459  1 !       constructed from dynamic storage and returned.
;  331          0460  1 !
;  332          0461  1 !       In case of a severe error return, a message argument vector must be
;  333          0462  1 !       constructed from dynamic storage and returned.
;  334          0463  1 !
;  335          0464  1 ! ROUTINE VALUE:
;  336          0465  1 !
;  337          0466  1 !       An unsigned integer longword completion code
;  338          0467  1 !
;  339          0468  1 ! COMPLETION CODES:
;  340          0469  1 !
;  341          0470  1 !       STS$K_SUCCESS (1) - Success. Value descriptor constructed and returned.
;  342          0471  1 !
;  343          0472  1 !       STS$K_SEVERE  (4) - Failure. Value descriptor not constructed. Message
;  344          0473  1 !                           argument vector constructed and returned.
;  345          0474  1 !
;  346          0475  1 ! SIDE EFFECTS:
;  347          0476  1 !
;  348          0477  1 !       NONE
;  349          0478  1 !
;  350          0479  2     BEGIN
;  351          0480  2
;  352          0481  2     MAP
;  353          0482  2         PRIM_DESC: REF DBG$PRIMARY;
;  354          0483  2
;  355          0484  2     ! Don't convert to value desc if the primary is an aggregate.
;  356          0485  2     !
;  357          0486  2     IF .PRIM_DESC [DBG$V_DHDR_AGGR]
;  358          0487  2     THEN
;  359          0488  2         .PARAM3 = .PRIM_DESC
;  360          0489  2     ELSE
;  361          0490  2         IF NOT DBG$PRIM_TO_VAL (
;  362          0491  2                 .PRIM_DESC,
;  363          0492  2                 (IF .PARAM2 THEN DBG$K_V_VALUE_DESC ELSE DBG$K_VALUE_DESC),
;  364          0493  2                 .PARAM3)
;  365          0494  2         THEN
;  366          0495  2             $DBG_ERROR ('DBGLANVEC\DBG$NMAKE_VAL_DESC bad return code from PRIM_TO_VAL');
;  367          0496  2     RETURN STS$K_SUCCESS;
;  368          0497  1     END;


                                                                    .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

24 47 42 44 5C 43 45 56 4E 41 4C 47 42 44 3D  00030 P.AAB:  .ASCII  \=DBGLANVEC\<92>\DBG$NMAKE_VAL_DESC bad \   ;
20 43 53 45 44 5F 4C 41 56 5F 45 4B 41 4D 4E  0003F                                                           ;
                                  20 64 61 62  0004E                                                           ;
6F 72 66 20 65 64 6F 63 20 6E 72 75 74 65 72  00052          .ASCII  \return code from PRIM_TO_VAL\            ;
      4C 41 56 5F 4F 54 5F 4D 49 52 50 20 6D  00061                                                           ;


                                                                    .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0
```

```
                                        0000 00000           .ENTRY  DBG$NMAKE_VAL_DESC, Save nothing                ; 0399
                                50      04 AC   D0 00002             MOVL    PRIM_DESC, R0                           ; 0486
                                06      04 A0   E9 00006             BLBC    4(R0), 1$
                            0C  BC              50 D0 0000A          MOVL    R0, @PARAM3                             ; 0488
                                                32 11 0000E          BRB     4$
                                        0C  AC  DD 00010 1$:         PUSHL   PARAM3                                  ; 0493
                                06      08  AC  E9 00013             BLBC    PARAM2, 2$                              ; 0492
                                7E      83  8F  9A 00017             MOVZBL  #131, -(SP)
                                                04 11 0001B          BRB     3$
                                7E      7A  8F  9A 0001D 2$:         MOVZBL  #122, -(SP)
                                                50 DD 00021 3$:      PUSHL   R0                                      ; 0491
                        00000000G       00      03 FB 00023          CALLS   #3, DBG$PRIM_TO_VAL
                                        15      50 E8 0002A          BLBS    R0, 4$
                                00000000'       EF 9F 0002D          PUSHAB  P.AAB                                   ; 0495
                                                01 DD 00033          PUSHL   #1
                                00028362        8F DD 00035          PUSHL   #164706
                        00000000G       00      03 FB 0003B          CALLS   #3, LIB$SIGNAL
                                        50              01 D0 00042 4$:      MOVL    #1, R0                          ; 0496
                                                        04 00045             RET                                     ; 0497

; Routine Size:  70 bytes,    Routine Base:  DBG$CODE + 006D
```

```
;  370     0498  1 GLOBAL ROUTINE DBG$NTYPE_CONV (VALUE_DESC, PARAM2, PARAM3, PARAM4, PARAM5) =
;  371     0499  1 !
;  372     0500  1 ! FUNCTIONAL DESCRIPTION:
;  373     0501  1 !
;  374     0502  1 !       Performs language specific and language independent type conversions.
;  375     0503  1 !       These will be both internal-to-internal and internal-to-external in
;  376     0504  1 !       nature. Target may be described by either language
;  377     0505  1 !       specific value descriptor or a subset of VAX standard descriptors.
;  378     0506  1 !       The latter category includes the following:
;  379     0507  1 !
;  380     0508  1 !       dsc$k_dtype_v
;  381     0509  1 !
;  382     0510  1 !       dsc$k_dtype_b, dsc$k_dtype_bu
;  383     0511  1 !
;  384     0512  1 !       dsc$k_dtype_w, dsc$k_dtype_wu
;  385     0513  1 !
;  386     0514  1 !       dsc$k_dtype_l, dsc$k_dtype_lu
;  387     0515  1 !
;  388     0516  1 !       dsc$k_dtype_q, dsc$k_dtype_qu
;  389     0517  1 !
;  390     0518  1 !       dsc$k_dtype_f, dsc$k_dtype_d
;  391     0519  1 !
;  392     0520  1 !       dsc$k_dtype_t
;  393     0521  1 !
;  394     0522  1 !       The source descriptor must be a language specific value descriptor.
;  395     0523  1 !
;  396     0524  1 !       Note that this routine will be used to obtain the 'printable' (external)
;  397     0525  1 !       value of the source as the result of EXAMINE commands.
;  398     0526  1 !
;  399     0527  1 !       This routine is still called from a couple of places; one is to
;  400     0528  1 !       convert the expression in an IF or a WHILE command to boolean;
;  401     0529  1 !       another is to display the value of watchpoints in "old value",
;  402     0530  1 !       "new value" displays. (This second use of this routine will go
;  403     0531  1 !       away when DBGEVENT replaces DBGEXC.)
;  404     0532  1 !
;  405     0533  1 ! FORMAL PARAMETERS:
;  406     0534  1 !
;  407     0535  1 !       value_desc      - A longword which contains the address of
;  408     0536  1 !                         a language specific value descriptor
;  409     0537  1 !
;  410     0538  1 !       param2          - A longword containing an integer encoding of the radix
;  411     0539  1 !                         to be used when converting to a 'printable' value:
;  412     0540  1 !
;  413     0541  1 !               dbg$k_default (1)       - source language default radix
;  414     0542  1 !
;  415     0543  1 !               dbg$k_binary (2)        - binary radix
;  416     0544  1 !
;  417     0545  1 !               dbg$k_octal (8)         - octal radix
;  418     0546  1 !
;  419     0547  1 !               dbg$k_decimal (10)      - decimal radix
;  420     0548  1 !
;  421     0549  1 !               dbg$k_hex (16)          - hexadecimal radix
;  422     0550  1 !
;  423     0551  1 !                       Note that this parameter is significant ONLY when the
;  424     0552  1 !                       object described by the source descriptor is to be
;  425     0553  1 !                       converted to external format. A request for a binary,
;  426     0554  1 !                       octal, or hex 'printable' value means to consider the
```

```
;  427     0555  1 ;                   value of source as a bit pattern to be translated to
;  428     0556  1 ;                   special characters. In this sense, the type of the source
;  429     0557  1 ;                   value is not significant - only the length. Values will
;  430     0558  1 ;                   therefore be displayed as unsigned integers within the
;  431     0559  1 ;                   specified radix. Values will be left-extended to nibble
;  432     0560  1 ;                   boundaries.
;  433     0561  1 ;
;  434     0562  1 ;           param3  - A longword containing an unsigned integer encoding of the
;  435     0563  1 ;                     type of information contained within the target parameter:
;  436     0564  1 ;
;  437     0565  1 ;                   dbg$k_vax_desc (130)      - target contains the address of a
;  438     0566  1 ;                                               VAX standard descriptor
;  439     0567  1 ;
;  440     0568  1 ;                                               Note: The caller of dbg$nxxx_type_conv
;  441     0569  1 ;                                               must assure that the dsc$a_pointer
;  442     0570  1 ;                                               field of the descriptor contains the
;  443     0571  1 ;                                               address of an appropriately large
;  444     0572  1 ;                                               block of storage.
;  445     0573  1 ;
;  446     0574  1 ;                   dbg$k_value_desc (122)    - target contains the address of a
;  447     0575  1 ;                                               language specific value descriptor.
;  448     0576  1 ;                                               The type convertor deposits the
;  449     0577  1 ;                                               value of Source into the address of
;  450     0578  1 ;                                               the value in Target.
;  451     0579  1 ;
;  452     0580  1 ;                   dbg$k_external_desc (129) - target contains the address of
;  453     0581  1 ;                                               a VAX standard string descriptor.
;  454     0582  1 ;                                               This is a request to convert to
;  455     0583  1 ;                                               'printable' format. Conversion must
;  456     0584  1 ;                                               include check for unprintable characters.
;  457     0585  1 ;
;  458     0586  1 ;           param4  - A longword which contains the address of either a VAX
;  459     0587  1 ;                     standard descriptor, or a language specific value descriptor
;  460     0588  1 ;
;  461     0589  1 ;           param5  - The address of a longword to contain the address of
;  462     0590  1 ;                     a message argument vector as described on page 4-119 of
;  463     0591  1 ;                     the VAX/VMS system reference, volume 1A
;  464     0592  1 ;
;  465     0593  1 ; IMPLICIT INPUTS:
;  466     0594  1 ;
;  467     0595  1 ;           NONE
;  468     0596  1 ;
;  469     0597  1 ; IMPLICIT OUTPUTS:
;  470     0598  1 ;
;  471     0599  1 ;           When this routine is called to obtain the 'printable' (external) value
;  472     0600  1 ;           of the source object, the target will contain the address of a VAX
;  473     0601  1 ;           standard string descriptor with length and pointer fields set to 0.
;  474     0602  1 ;           Dynamic storage must be obtained to contain the resulting ascii string.
;  475     0603  1 ;
;  476     0604  1 ;           In all other cases, this routine is not required to allocate storage to
;  477     0605  1 ;           contain the resulting value of a conversion request. Targets which are
;  478     0606  1 ;           described by VAX standard descriptors MUST contain the address of a
;  479     0607  1 ;           block of storage (the dsc$a_pointer field)
;  480     0608  1 ;           in which the resulting value of the conversion will be stored.
;  481     0609  1 ;
;  482     0610  1 ;           Dynamic storage must be used to construct the message argument vector
;  483     0611  1 ;           upon a severe error return.
```

```
;  484          0612  1 !
;  485          0613  1 ROUTINE VALUE:
;  486          0614  1 !
;  487          0615  1 !       unsigned integer longword completion code
;  488          0616  1 !
;  489          0617  1 COMPLETION CODES:
;  490          0618  1 !
;  491          0619  1 !       STS$K_SUCCESS (1) - Success. Conversion performed.
;  492          0620  1 !
;  493          0621  1 !       STS$K_SEVERE  (4) - Failure. No conversion. Message argument vector
;  494          0622  1 !                           constructed and returned.
;  495          0623  1 !
;  496          0624  1 SIDE EFFECTS:
;  497          0625  1 !
;  498          0626  1 !       Informational messages such as string and number truncation may be
;  499          0627  1 !       issued during processing.
;  500          0628  1 !
;  501          0629  1
;  502          0630  2     BEGIN
;  503          0631  2
;  504          0632  2     SELECTONE .PARAM3 OF
;  505          0633  2         SET
;  506          0634  2
;  507          0635  2         ! One place this routine is called is in the processing of the
;  508          0636  2         ! IF, WHILE, and INCR commands, in order to convert the given
;  509          0637  2         ! value to a type understood by the command.
;  510          0638  2         ! In these cases, the third parameter is DBG$K_VAX_DESC and
;  511          0639  2         ! the fourth parameter is a pointer to a VAX standard descriptor.
;  512          0640  2         !
;  513          0641  2         [DBG$K_VAX_DESC] :
;  514          0642  3             BEGIN
;  515          0643  3             LOCAL
;  516          0644  3                 V_VAL_DESC: REF DBG$VALDESC;
;  517          0645  3
;  518          0646  3             ! Build a volatile value descriptor around the given VAX
;  519          0647  3             ! standard descriptor.
;  520          0648  3             !
;  521          0649  3             V_VAL_DESC = DBG$GET_TEMPMEM (DBG$K_VALDESC_BASE_SIZE+4);
;  522          0650  3             CA$MOVE (12, .VALUE_DESC, .V_VAL_DESC);
;  523          0651  3             V_VAL_DESC[DBG$B_DHDR_TYPE] = DBG$K_V_VALUE_DESC;
;  524          0652  3             V_VAL_DESC[DBG$W_DHDR_LENGTH] = 4 + (DBG$K_VALDESC_BASE_SIZE+4);
;  525          0653  3             CA$MOVE (12, .PARAM4, V_VAL_DESC[DBG$A_VALUE_VMSDESC]);
;  526          0654  3
;  527          0655  3             ! Call the EVAL_LANG_OPERATOR routine to do the conversion.
;  528          0656  3             !
;  529          0657  3             DBG$EVAL_LANG_OPERATOR (
;  530          0658  3                         DBG$GL_CONVERT_TOKEN,
;  531          0659  3                         .VALUE_DESC,
;  532          0660  3                         .V_VAL_DESC);
;  533          0661  3             END;
;  534          0662  2
;  535          0663  2         ! Another case is during the output of watchpoints in
;  536          0664  2         ! "old value", "new value".
;  537          0665  2         !
;  538          0666  2         [DBG$K_EXTERNAL_DESC] :
;  539          0667  3             BEGIN
;  540          0668  3             MAP
```

```
;  541          0669  3                  VALUE_DESC: REF DBG$PRIMARY;
;  542          0670  3
;  543          0671  3              ! Check for aggregate.
;  544          0672  3              !
;  545          0673  3              IF .VALUE_DESC [DBG$V_DHDR_AGGR]
;  546          0674  3              THEN
;  547          0675  3                  DBG$PRINT_AGGREGATE (.VALUE_DESC, .PARAM2)
;  548          0676  3
;  549          0677  3              ELSE
;  550          0678  3
;  551          0679  3                  ! Call the PRINT_VALUE routine
;  552          0680  3                  !
;  553          0681  3                  DBG$PRINT_VALUE (.VALUE_DESC, .PARAM2, FALSE, FALSE);
;  554          0682  3
;  555          0683  3              ! This is kind of a kludge. We fill in a -1 to PARAM5
;  556          0684  3              ! and this indicates to the caller in DBGEXC that the
;  557          0685  3              ! value has already been displayed.
;  558          0686  3              !
;  559          0687  3              .PARAM5 = -1;
;  560          0688  2              END;
;  561          0689  2
;  562          0690  2          ! I don't think there are any other cases where this routine
;  563          0691  2          ! is still used, so signal an internal DEBUG error.
;  564          0692  2          !
;  565          0693  2          [OTHERWISE] :
;  566          0694  2              $DBG_ERROR ('DBGLANVEC\DBG$NTYPE_CONV');
;  567          0695  2
;  568          0696  2          TES;
;  569          0697  2      RETURN STS$K_SUCCESS;
;  570          0698  1      END;


                                                        .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0
24 47 42 44 5C 43 45 56 4E 41 4C 47 42 44 18  0006E P.AAC:  .ASCII  <24>\DBGLANVEC\<92>\DBG$NTYPE_CONV\                ;
                  56 4E 4F 43 5F 45 50 59 54 4E  0007D

                                                        .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                                 007C 00000     .ENTRY  DBG$NTYPE_CONV, Save R2,R3,R4,R5,R6            ; 0498
                                  50      0C     AC   D0 00002  MOVL   PARAM3, R0                                      ; 0632
                          00000082    8F         50   D1 00006  CMPL   R0, #130                                       ; 0641
                                                  33   12 0000D  BNEQ   1$                                           ;
                                                  0C   DD 0000F  PUSHL  #12                                          ; 0649
                          00000000G   00         01   FB 00011  CALLS  #1, DBG$GET_TEMPMEM                          ;
                                      56         50   D0 00018  MOVL   R0, V_VAL_DESC                               ;
                      66        04    BC         0C   28 0001B  MOVC3  #12, @VALUE_DESC, (V_VAL_DESC)               ; 0650
                                02    A6      83 8F   90 00020  MOVB   #-125, 2(V_VAL_DESC)                         ; 0651
                                      66         30   B0 00025  MOVW   #48, (V_VAL_DESC)                           ; 0652
                  14  A6        10    BC         0C   28 00028  MOVC3  #12, @PARAM4, 20(V_VAL_DESC)                 ; 0653
                                                  56   DD 0002E  PUSHL  V_VAL_DESC                                 ; 0660
                                           04     AC   DD 00030  PUSHL  VALUE_DESC                                  ; 0659
                                  00000000G   00   9F   00033  PUSHAB DBG$GL_CONVERT_TOKEN                        ; 0657
                          00000000G   00         03   FB 00039  CALLS  #3, DBG$EVAL_LANG_OPERATOR                  ;
```

```
                                48 11 00040       BRB     5$                              ; 0632
          00000081   8F         50 D1 00042 1$:   CMPL    R0, #129                        ; 0666
                                2A 12 00049       BNEQ    4$                              ;
                     52     04  AC D0 0004B       MOVL    VALUE_DESC, R2                  ; 0673
                     0E     04  A2 E9 0004F       BLBC    4(R2), 2$                       ;
                            08  AC DD 00053       PUSHL   PARAM2                          ; 0675
                                52 DD 00056       PUSHL   R2                              ;
          00000000G  00         02 FB 00058       CALLS   #2, DBG$PRINT_AGGREGATE         ;
                                0E 11 0005F       BRB     3$                              ;
                                7E 7C 00061 2$:   CLRQ    -(SP)                           ; 0681
                            08  AC DD 00063       PUSHL   PARAM2                          ;
                                52 DD 00066       PUSHL   R2                              ;
          00000000G  00         04 FB 00068       CALLS   #4, DBG$PRINT_VALUE             ;
                 14  BC         01 CE 0006F 3$:   MNEGL   #1, @PARAM5                     ; 0687
                                15 11 00073       BRB     5$                              ; 0632
                      00000000' EF 9F 00075 4$:   PUSHAB  P.AAC                           ; 0694
                                01 DD 0007B       PUSHL   #1                              ;
                      00028362  8F DD 0007D       PUSHL   #164706                         ;
          00000000G  00         03 FB 00083       CALLS   #3, LIB$SIGNAL                  ;
                     50         01 D0 0008A 5$:   MOVL    #1, R0                          ; 0697
                                   04 0008D       RET                                     ; 0698

; Routine Size:  142 bytes,    Routine Base:  DBG$CODE + 00B3
```

```
;  572          0699  1 GLOBAL ROUTINE DBG$NSYMBOLIZE (PRIM_DESC, PARAM2, PARAM3) =
;  573          0700  1 !
;  574          0701  1 !  FUNCTION
;  575          0702  1 !        Prints the name given by the primary descriptor, in the
;  576          0703  1 !        appropriate language format. This routine actually just
;  577          0704  1 !        passes the descriptor along to the new routine
;  578          0705  1 !        DBG$PRINT_IDENTIFIER.
;  579          0706  1 !
;  580          0707  1 !  FORMAL PARAMETERS:
;  581          0708  1 !
;  582          0709  1 !        PRIM_DESC       - A longword containing the address of a language specific
;  583          0710  1 !                          primary descriptor
;  584          0711  1 !
;  585          0712  1 !        PARAM2, PARAM3  - Unknown to this routine
;  586          0713  1 !
;  587          0714  1 !  IMPLICIT INPUTS:
;  588          0715  1 !
;  589          0716  1 !        NONE
;  590          0717  1 !
;  591          0718  1 !  IMPLICIT OUTPUTS:
;  592          0719  1 !
;  593          0720  1 !        Same as the invoked routine
;  594          0721  1 !
;  595          0722  1 !  ROUTINE VALUE:
;  596          0723  1 !
;  597          0724  1 !        Same as the invoked routine
;  598          0725  1 !
;  599          0726  1 !  COMPLETION CODES:
;  600          0727  1 !
;  601          0728  1 !        Same as the invoked routine
;  602          0729  1 !
;  603          0730  1 !  SIDE EFFECTS:
;  604          0731  1 !
;  605          0732  1 !        Same as the invoked routine.
;  606          0733  1 !
;  607          0734  1 !        This routine will generate a SIGNAL upon detection of a foreign
;  608          0735  1 !        language value within the primary descriptor.
;  609          0736  1 !
;  610          0737  2     BEGIN
;  611          0738  2     DBG$PRINT_IDENTIFIER (.PRIM_DESC);
;  612          0739  2     RETURN STS$K_SUCCESS;
;  613          0740  1     END;


                                        0000 00000          .ENTRY  DBG$NSYMBOLIZE, Save nothing                    ; 0699
                                  04    AC  DD 00002        PUSHL   PRIM_DESC                                       ; 0738
                    00000000G     00        01  FB 00005    CALLS   #1, DBG$PRINT_IDENTIFIER                        ;
                                  50        01  D0 0000C    MOVL    #1, R0                                          ; 0739
                                            04 0000F        RET                                                     ; 0740

; Routine Size:  16 bytes,    Routine Base:  DBG$CODE + 0141
```

```
;  615          0741  1 GLOBAL ROUTINE DBG$NGET_PAGES (PRIM_DESC, PARAM2, PARAM3) =
;  616          0742  1
;  617          0743  1 !++
;  618          0744  1 ! FUNCTIONAL DESCRIPTION:
;  619          0745  1 !
;  620          0746  1 !       Uses a symbol's primary descriptor to construct a linked list of page
;  621          0747  1 !       numbers which reflect those pages of storage in which the symbol's
;  622          0748  1 !       rvalue is contained. Note that the pages may be non-contiguous.
;  623          0749  1 !
;  624          0750  1 !       A page number is represented by the high order 23 bits of a virtual
;  625          0751  1 !       address, with the low order 9 bits set to 0:
;  626          0752  1 !
;  627          0753  1 !       page = (virtual__address AND B'11111111111111111111111000000000')
;  628          0754  1 !
;  629          0755  1 !       At implementation level 2,
;  630          0756  1 !       This routine calls a language-specific routine depending on the language
;  631          0757  1 !       code in the header of the descriptor.
;  632          0758  1 !
;  633          0759  1 !       At implementation level 3, the descriptors are the same so the
;  634          0760  1 !       work is done right here.
;  635          0761  1 !
;  636          0762  1 ! FORMAL PARAMETERS:
;  637          0763  1 !
;  638          0764  1 !       prim_desc       - A longword containing the address of a primary descriptor
;  639          0765  1 !
;  640          0766  1 !       param2          - The address of a longword to contain the address of the
;  641          0767  1 !                         head node in the page list. Nodes in the page list
;  642          0768  1 !                         consist of blocks of two longwords each. The second
;  643          0769  1 !                         longword of the node block contains a page number on
;  644          0770  1 !                         which some portion of the symbol's rvalue resides. The
;  645          0771  1 !                         first longword of the node block contains the address
;  646          0772  1 !                         of the next node in the list. The last node in the list
;  647          0773  1 !                         should contain a 0 in this link field.
;  648          0774  1 !
;  649          0775  1 !       param3          - The address of a longword to contain the address of
;  650          0776  1 !                         a message argument vector as described on page 4-119
;  651          0777  1 !                         of the VAX/VMS system reference, volume 1A
;  652          0778  1 !
;  653          0779  1 ! IMPLICIT INPUTS:
;  654          0780  1 !
;  655          0781  1 !       NONE
;  656          0782  1 !
;  657          0783  1 ! IMPLICIT OUTPUTS:
;  658          0784  1 !
;  659          0785  1 !       In case of a success return, the page list is constructed from dynamic
;  660          0786  1 !       storage and returned.
;  661          0787  1 !
;  662          0788  1 !       In case of a severe error return, a message arguement vector is constructed
;  663          0789  1 !       and returned.
;  664          0790  1 !
;  665          0791  1 ! ROUTINE VALUE:
;  666          0792  1 !
;  667          0793  1 !       An unsigned integer longword completion code
;  668          0794  1 !
;  669          0795  1 ! COMPLETION CODES:
;  670          0796  1 !
;  671          0797  1 !       STS$K_SUCCESS (1) - Success. Page list constructed and returned.
```

```
;  672     0798  1 !
;  673     0799  1 !       STS$K_SEVERE  (4) - Failure. Page list not constructed. Message argument
;  674     0800  1 !                           vector constructed and returned.
;  675     0801  1 !
;  676     0802  1 ! SIDE EFFECTS:
;  677     0803  1 !
;  678     0804  1 !       NONE
;  679     0805  1 !
;  680     0806  2     BEGIN
;  681     0807  2
;  682     0808  2     MAP
;  683     0809  2         PRIM_DESC: REF DBG$PRIMARY;
;  684     0810  2
;  685     0811  2     LOCAL
;  686     0812  2         BIT_LENGTH,                         ! Length of data in bits
;  687     0813  2         CURRENT_BLOCK: REF DBG$LINK_NODE,   ! Pointer to current page
;  688     0814  2                                             !    number block
;  689     0815  2         CURRENT_PAGE_ADDRESS,               ! A page address
;  690     0816  2         END_ADDRESS,                        ! Last page address
;  691     0817  2         NEXT_BLOCK: REF DBG$LINK_NODE,      ! Pointer to the next page
;  692     0818  2                                             !    number block
;  693     0819  2         POS,
;  694     0820  2         VMS_DESC: REF DBG$STG_DESC,
;  695     0821  2         VMS_DESC_AREA: DBG$STG_DESC;
;  696     0822  2
;  697     0823  2     ! For volatile value descriptors we already have a vms desc.
;  698     0824  2     !
;  699     0825  2     IF .PRIM_DESC [DBG$B_DHDR_TYPE] EQL DBG$K_V_VALUE_DESC
;  700     0826  2     OR .PRIM_DESC [DBG$B_DHDR_TYPE] EQL DBG$K_VALUE_DESC
;  701     0827  2     THEN
;  702     0828  2         VMS_DESC = PRIM_DESC [DBG$A_VALUE_VMSDESC]
;  703     0829  2     ELSE IF .PRIM_DESC [DBG$B_DHDR_TYPE] EQL DBG$K_PRIMARY_DESC
;  704     0830  2     THEN
;  705     0831  3         BEGIN
;  706     0832  3
;  707     0833  3         ! Turn the primary descriptor into a VMS descriptor.
;  708     0834  3         !
;  709     0835  3         VMS_DESC = VMS_DESC_AREA;
;  710     0836  3         IF NOT DBG$MAKE_VMS_DESC (.PRIM_DESC, .VMS_DESC)
;  711     0837  3         THEN
;  712     0838  3             $DBG_ERROR ('DBGLANVEC\DBG$NGET_PAGES');
;  713     0839  3         END
;  714     0840  2     ELSE
;  715     0841  3         $DBG_ERROR ('DBGLANVEC\DBG$NGET_PAGES');
;  716     0842  2
;  717     0843  2     ! The first address is given in the VMS descriptor. The end address
;  718     0844  2     ! must be computed from the bit length and the bit offset.
;  719     0845  2     !
;  720     0846  2     CURRENT_PAGE_ADDRESS = .VMS_DESC[DSC$A_POINTER] AND %X'FFFFFE00';
;  721     0847  2     BIT_LENGTH = DBG$DATA_LENGTH (.VMS_DESC);
;  722     0848  2     IF .VMS_DESC[DSC$B_CLASS] EQL DSC$K_CLASS_UBS
;  723     0849  2     THEN
;  724     0850  2         POS = .VMS_DESC[DSC$L_POS]
;  725     0851  2     ELSE
;  726     0852  2         POS = 0;
;  727     0853  2     END_ADDRESS = .VMS_DESC[DSC$A_POINTER] + (.BIT_LENGTH + .POS - 1)/8;
;  728     0854  2
```

```
;  729          0855  2
;  730          0856  2      ! Loop through the pages.
;  731          0857  2      !
;  732          0858  2      CURRENT_BLOCK = 0;
;  733          0859  2      WHILE .CURRENT_PAGE_ADDRESS LEQ .END_ADDRESS DO
;  734          0860  2          BEGIN
;  735          0861  2
;  736          0862  2          ! Allocate space for a new node. Fill in the value field
;  737          0863  2          ! and link it in to the list (the list is actually being
;  738          0864  2          ! constructed backwards). Increment CURRENT_PAGE_ADDRESS to
;  739          0865  2          ! the next page and loop.
;  740          0866  2          !
;  741          0867  2          NEXT_BLOCK = DBG$GET_TEMPMEM (DBG$K_LINK_NODE_SIZE);
;  742          0868  2          NEXT_BLOCK[DBG$L_LINK_NODE_LINK] = .CURRENT_BLOCK;
;  743          0869  2          NEXT_BLOCK[DBG$L_LINK_NODE_VALUE] = .CURRENT_PAGE_ADDRESS;
;  744          0870  2          CURRENT_BLOCK = .NEXT_BLOCK;
;  745          0871  2          CURRENT_PAGE_ADDRESS = .CURRENT_PAGE_ADDRESS + 512;
;  746          0872  2          END;
;  747          0873  2
;  748          0874  2      ! Return the address of the last block.
;  749          0875  2      !
;  750          0876  2      .PARAM2 = .CURRENT_BLOCK;
;  751          0877  2      RETURN STS$K_SUCCESS;
;  752          0878  1      END;


                                                        .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0
24 47 42 44 5C 43 45 56 4E 41 4C 47 42 44 18  00087 P.AAD:  .ASCII  <24>\DBGLANVEC\<92>\DBG$NGET_PAGES\                ;
               53 45 47 41 50 5F 54 45 47 4E  00096
24 47 42 44 5C 43 45 56 4E 41 4C 47 42 44 18  000A0 P.AAE:  .ASCII  <24>\DBGLANVEC\<92>\DBG$NGET_PAGES\                ;
               53 45 47 41 50 5F 54 45 47 4E  000AF


                                                        .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                                 001C 00000         .ENTRY  DBG$NGET_PAGES, Save R2,R3,R4                ; 0741
                                              5E    0C   C2 00002         SUBL2   #12, SP                              ;
00000083   8F     04   BC                    08    10   ED 00005         CMPZV   #16, #8, @PRIM_DESC, #131            ; 0825
                                                 0C   13 0000F         BEQL    1$                                   ;
0000007A   8F     04   BC                    08    10   ED 00011         CMPZV   #16, #8, @PRIM_DESC, #122            ; 0826
                                                 07   12 0001B         BNEQ    2$                                   ;
                  52        04   AC                14   C1 0001D 1$:     ADDL3   #20, PRIM_DESC, VMS_DESC             ; 0828
                                                 38   11 00022         BRB     5$                                   ;
00000079   8F     04   BC                    08    10   ED 00024 2$:     CMPZV   #16, #8, @PRIM_DESC, #121            ; 0829
                                                 1A   12 0002E         BNEQ    3$                                   ;
                                              52    6E   9E 00030         MOVAB   VMS_DESC_AREA, VMS_DESC              ; 0835
                                                    52   DD 00033         PUSHL   VMS_DESC                             ; 0836
                                                    AC   DD 00035         PUSHL   PRIM_DESC                            ;
                                        00000000G 00   02   FB 00038         CALLS   #2, DBG$MAKE_VMS_DESC                ;
                                                 1D    50   E8 0003F         BLBS    R0, 5$                               ;
                                  00000000'          EF   9F 00042         PUSHAB  P.AAD                                ; 0838
                                                 06   11 00048         BRB     4$                                   ;
                                  00000000'          EF   9F 0004A 3$:     PUSHAB  P.AAE                                ; 0841
                                                 01   DD 00050 4$:     PUSHL   #1                                   ;
```

```
                                00028362    8F   DD 00052          PUSHL   #164706                                          ;
                    00000000G   00          03   FB 00058          CALLS   #3, LIB$SIGNAL                                  ;
                54        04    A2 000001FF 8F   CB 0005F 5$:      BICL3   #511, 4(VMS_DESC), CURRENT_PAGE_ADDRESS         ; 0846
                                            52   DD 00068          PUSHL   VMS_DESC                                        ; 0847
                    00000000G   00          01   FB 0006A          CALLS   #1, DBG$DATA_LENGTH                             ;
                                0D      03  A2   91 00071          CMPB    3(VMS_DESC), #13                                ; 0848
                                            06   12 00075          BNEQ    6$                                              ;
                                51      08  A2   D0 00077          MOVL    8(VMS_DESC), POS                                ; 0850
                                            02   11 0007B          BRB     7$                                              ;
                                            51   D4 0007D 6$:       CLRL    POS                                             ; 0852
                                50      FF A140  9E 0007F 7$:       MOVAB   -1(POS)[BIT_LENGTH], R0                         ; 0853
                                50          08   C6 00084          DIVL2   #8, R0                                          ;
                53              50      04   A2   C1 00087          ADDL3   4(VMS_DESC), R0, END_ADDRESS                    ;
                                            52   D4 0008C          CLRL    CURRENT_BLOCK                                   ; 0858
                                53          54   D1 0008E 8$:       CMPL    CURRENT_PAGE_ADDRESS, END_ADDRESS               ; 0859
                                            1A   14 00091          BGTR    9$                                              ;
                                            02   DD 00093          PUSHL   #2                                              ; 0867
                    00000000G   00          01   FB 00095          CALLS   #1, DBG$GET_TEMPMEM                             ;
                                60          52   D0 0009C          MOVL    CURRENT_BLOCK, (NEXT_BLOCK)                     ; 0868
                        04      A0          84   7E 0009F          MOVAQ   (CURRENT_PAGE_ADDRESS)+, 4(NEXT_BLOCK)          ; 0869
                                52          50   D0 000A3          MOVL    NEXT_BLOCK, CURRENT_BLOCK                       ; 0870
                                54      01F8 C4   9E 000A6          MOVAB   504(R4), CURRENT_PAGE_ADDRESS                   ; 0871
                                            E1   11 000AB          BRB     8$                                              ; 0859
                        08      BC          52   D0 000AD 9$:       MOVL    CURRENT_BLOCK, @PARAM2                          ; 0876
                                50          01   D0 000B1          MOVL    #1, R0                                          ; 0877
                                                 04 000B4          RET                                                     ; 0878

; Routine Size:  181 bytes,    Routine Base:  DBG$CODE + 0151
```

```
;  754     0879  1 GLOBAL ROUTINE DBG$NGET_LENGTH (PRIM_DESC, PARAM2, PARAM3) =
;  755     0880  1 !++
;  756     0881  1 ! FUNCTIONAL DESCRIPTION:
;  757     0882  1 !
;  758     0883  1 !       Uses a symbol's primary descriptor to obtain the length of the symbol's
;  759     0884  1 !       rvalue. The length is to be given in bits. Lengths longer than 2 ** 32
;  760     0885  1 !       must be truncated to this length.
;  761     0886  1 !
;  762     0887  1 !       The debugger assumes that rvalues refer to contiguous blocks of storage.
;  763     0888  1 !       If this is not true for a given variable, this routine fails.
;  764     0889  1 !
;  765     0890  1 !       Length should reflect the maximum length for entities that may vary in
;  766     0891  1 !       size, and include the length of a control word, if one is present.
;  767     0892  1 !
;  768     0893  1 !       If the value of the object can not be materialized by the Type Convertor
;  769     0894  1 !       (DBG$NTYPE_CONV), this routine should return STS$K_INFO. This is
;  770     0895  1 !       generally true for objects of aggregate type, e.g., PASCAL arrays and
;  771     0896  1 !       record, PL/I structures.
;  772     0897  1 !
;  773     0898  1 !       This routine calls a language-specific routine based on the language
;  774     0899  1 !       code in the descriptor header.
;  775     0900  1 !
;  776     0901  1 ! FORMAL PARAMETERS:
;  777     0902  1 !
;  778     0903  1 !       prim_desc       - A longword containing the address of a primary descriptor
;  779     0904  1 !
;  780     0905  1 !       param2          - The address of a longword to contain an unsigned integer
;  781     0906  1 !                         longword representing the symbol's rvalue length in bits
;  782     0907  1 !
;  783     0908  1 !       param3          - The address of a longword to contain the address of a
;  784     0909  1 !                         message argument vector as described on page 4-119 of
;  785     0910  1 !                         the VAX/VMS system reference, volume 1A
;  786     0911  1 !
;  787     0912  1 ! IMPLICIT INPUTS:
;  788     0913  1 !
;  789     0914  1 !       NONE
;  790     0915  1 !
;  791     0916  1 ! IMPLICIT OUTPUTS:
;  792     0917  1 !
;  793     0918  1 !       In case of a severe error return, a message argument vector is constructed
;  794     0919  1 !       from dynamic storage and returned.
;  795     0920  1 !
;  796     0921  1 ! ROUTINE VALUE:
;  797     0922  1 !
;  798     0923  1 !       An unsigned integer longword completion code
;  799     0924  1 !
;  800     0925  1 ! COMPLETION CODES:
;  801     0926  1 !
;  802     0927  1 !       STS$K_SUCCESS (1) - Success. Length of symbol's rvalue returned.
;  803     0928  1 !
;  804     0929  1 !       STS$K_INFO    (3) - Success. Length of the symbol's rvalue returned but
;  805     0930  1 !                           the symbol refers to a value that the Type Convertor
;  806     0931  1 !                           cannot materialize.
;  807     0932  1 !
;  808     0933  1 !       STS$K_SEVERE  (4) - Failure. No length returned. Message argument vector
;  809     0934  1 !                           constructed and returned.
;  810     0935  1 !
```

```
;  811     0936  1 ! SIDE EFFECTS:
;  812     0937  1 !
;  813     0938  1 !       NONE
;  814     0939  1 !
;  815     0940  1 !
;  816     0941  2     BEGIN
;  817     0942  2
;  818     0943  2     MAP
;  819     0944  2         PRIM_DESC: REF DBG$VALDESC;
;  820     0945  2     LOCAL
;  821     0946  2         VMS_DESC,
;  822     0947  2         VMS_DESC_AREA: DBG$STG_DESC;
;  823     0948  2
;  824     0949  2     ! Primary Descriptors.
;  825     0950  2     !
;  826     0951  2     IF .PRIM_DESC [DBG$B_DHDR_TYPE] EQL DBG$K_PRIMARY_DESC
;  827     0952  2     THEN
;  828     0953  2         BEGIN
;  829     0954  2
;  830     0955  2         ! Call a routine to construct the VMS descriptor.
;  831     0956  2         !
;  832     0957  2         VMS_DESC = VMS_DESC_AREA;
;  833     0958  2         IF NOT DBG$MAKE_VMS_DESC (.PRIM_DESC, .VMS_DESC)
;  834     0959  2         THEN
;  835     0960  2             $DBG_ERROR ('DBGLANVEC\DBG$NGET_LENGTH');
;  836     0961  2         END
;  837     0962  2
;  838     0963  2     ! Volatile Value Descriptors or Value Descriptors.
;  839     0964  2     !
;  840     0965  2     ELSE IF .PRIM_DESC [DBG$B_DHDR_TYPE] EQL DBG$K_V_VALUE_DESC
;  841     0966  2     OR .PRIM_DESC [DBG$B_DHDR_TYPE] EQL DBG$K_VALUE_DESC
;  842     0967  2     THEN
;  843     0968  2
;  844     0969  2         ! In this case just get the VMS descriptor out of the
;  845     0970  2         ! volatile value descriptor.
;  846     0971  2         !
;  847     0972  2         VMS_DESC = PRIM_DESC [DBG$A_VALUE_VMSDESC]
;  848     0973  2
;  849     0974  2     ! We do not expect any other kind of descriptor.
;  850     0975  2     !
;  851     0976  2     ELSE
;  852     0977  2         $DBG_ERROR ('DBGLANVEC\DBG$NGET_LENGTH unknown descriptor type');
;  853     0978  2
;  854     0979  2
;  855     0980  2     ! Call the routine in DBGVALUES that extracts a bit length from
;  856     0981  2     ! a VMS descriptor.
;  857     0982  2     !
;  858     0983  2     .PARAM2 = DBG$DATA_LENGTH (.VMS_DESC);
;  859     0984  2     RETURN STS$K_SUCCESS;
;  860     0985  1     END;


                                                                .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

24  47  42  44  5C  43  45  56  4E  41  4C  47  42  44  19  000B9 P.AAF:  .ASCII  <25>\DBGLANVEC\<92>\DBG$NGET_LENGTH\        ;
                48  54  47  4E  45  4C  5F  54  45  47  4E  000C8                                                            ;
```

```
24 47 42 44 5C 43 45 56 4E 41 4C 47 42 44 31 000D3 P.AAG:  .ASCII  \1DBGLANVEC\<92>\DBG$NGET_LENGTH unknown\      ;
6B 6E 75 20 48 54 47 4E 45 4C 5F 54 45 47 4E 000E2                                                               ;
                                  6E 77 6F 6E 000F1                                                               ;
70 79 74 20 72 6F 74 70 69 72 63 73 65 64 20 000F5          .ASCII  \ descriptor type\                             ;
                                           65 00104                                                               ;



                                                            .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                         0004 00000         .ENTRY  DBG$NGET_LENGTH, Save R2                    ; 0879
                          5E             0C   C2 00002      SUBL2   #12, SP                                      ;
00000079  8F    04  BC    08             10   ED 00005      CMPZV   #16, #8, @PRIM_DESC, #121                    ; 0951
                                         1A   12 0000F      BNEQ    1$                                           ;
                          52             6E   9E 00011      MOVAB   VMS_DESC_AREA, VMS_DESC                      ; 0957
                                         52   DD 00014      PUSHL   VMS_DESC                                     ; 0958
                                    04   AC   DD 00016      PUSHL   PRIM_DESC                                    ;
               00000000G  00             02   FB 00019      CALLS   #2, DBG$MAKE_VMS_DESC                        ;
                          3C             50   E8 00020      BLBS    R0, 5$                                       ;
                             00000000'   EF   9F 00023      PUSHAB  P.AAF                                        ; 0960
                                         25   11 00029      BRB     4$                                           ;
00000083  8F    04  BC    08             10   ED 0002B 1$:  CMPZV   #16, #8, @PRIM_DESC, #131                    ; 0965
                                         0C   13 00035      BEQL    2$                                           ;
0000007A  8F    04  BC    08             10   ED 00037      CMPZV   #16, #8, @PRIM_DESC, #122                    ; 0966
                                         07   12 00041      BNEQ    3$                                           ;
                    52    04  AC         14   C1 00043 2$:  ADDL3   #20, PRIM_DESC, VMS_DESC                     ; 0972
                                         15   11 00048      BRB     5$                                           ;
                             00000000'   EF   9F 0004A 3$:  PUSHAB  P.AAG                                        ; 0977
                                         01   DD 00050 4$:  PUSHL   #1                                           ;
                             00028362    8F   DD 00052      PUSHL   #164706                                      ;
               00000000G  00             03   FB 00058      CALLS   #3, LIB$SIGNAL                               ;
                                         52   DD 0005F 5$:  PUSHL   VMS_DESC                                     ; 0983
               00000000G  00             01   FB 00061      CALLS   #1, DBG$DATA_LENGTH                          ;
                      08  BC             50   D0 00068      MOVL    R0, @PARAM2                                  ;
                          50             01   D0 0006C      MOVL    #1, R0                                       ; 0984
                                         04 0006F           RET                                                  ; 0985

; Routine Size:  112 bytes,    Routine Base:  DBG$CODE + 0206
```

```
;  862          0986  1 GLOBAL ROUTINE DBG$NCOPY_DESC (DESC, PARAM2, PARAM3, PARAM4) =
;  863          0987  1 !
;  864          0988  1 ! FUNCTIONAL DESCRIPTION:
;  865          0989  1 !
;  866          0990  1 !       Accepts as input a language specific primary or value descriptor
;  867          0991  1 !       (constructed from listed storage)
;  868          0992  1 !       and makes a copy of the descriptor out of non-listed storage. This
;  869          0993  1 !       non-volatile copy will be stored in conjunction with x-points and
;  870          0994  1 !       current location.
;  871          0995  1 !
;  872          0996  1 !       This routine may use DBG$NCOPY to copy each portion of the
;  873          0997  1 !       descriptor that has been created from listed dynamic storage.
;  874          0998  1 !
;  875          0999  1 ! FORMAL PARAMETERS:
;  876          1000  1 !
;  877          1001  1 !       desc                    - The address of a language specifc primary or
;  878          1002  1 !                                 value descriptor
;  879          1003  1 !
;  880          1004  1 !       param2                  - The address of a longword to contain the address
;  881          1005  1 !                                 of the non-volatile copy of the descriptor
;  882          1006  1 !
;  883          1007  1 !       param3                  - The address of a longword to contain the address
;  884          1008  1 !                                 of a message argument vector for errors
;  885          1009  1 !
;  886          1010  1 !       param4                  - A flag saying whether to copy into permanent
;  887          1011  1 !                                 memory or temporary memory. Only used in
;  888          1012  1 !                                 implementation level 3.
;  889          1013  1 ! IMPLICIT INPUTS:
;  890          1014  1 !
;  891          1015  1 !       NONE
;  892          1016  1 !
;  893          1017  1 ! IMPLICIT OUTPUTS:
;  894          1018  1 !
;  895          1019  1 !       On success, the non-volatile copy of a primary descriptor.
;  896          1020  1 !
;  897          1021  1 !       On failure, a message argument vector.
;  898          1022  1 !
;  899          1023  1 ! ROUTINE VALUE:
;  900          1024  1 !
;  901          1025  1 !       An unsigned integer longword completion code
;  902          1026  1 !
;  903          1027  1 ! COMPLETION CODES:
;  904          1028  1 !
;  905          1029  1 !       STS$K_SUCCESS   (1)     - Success. Copy constructed and returned.
;  906          1030  1 !
;  907          1031  1 !       STS$K_SEVERE    (4)     - Failure. Copy not produced. Message argument
;  908          1032  1 !                                 vector constructed and returned.
;  909          1033  1 !
;  910          1034  1 ! SIDE EFFECTS:
;  911          1035  1 !
;  912          1036  1 !       NONE
;  913          1037  1 !
;  914          1038  2     BEGIN
;  915          1039  2
;  916          1040  2     MAP
;  917          1041  2         DESC: REF DBG$VALDESC;
;  918          1042  2
```

```
;  919          1043  2     BUILTIN
;  920          1044  2         ACTUALCOUNT;                ! Count of acual parameters.
;  921          1045  2
;  922          1046  2     LOCAL
;  923          1047  2         LENGTH,                     ! Length in bytes of copy
;  924          1048  2         PERM_FLAG;                  ! Flag saying whether to copy into permanent
;  925          1049  2                                     !    or temporary memory.
;  926          1050  2
;  927          1051  2     ! Enable a handler which will take care of NOFREE error messages.
;  928          1052  2     ! The reason for this is, if we run out of memory part way through
;  929          1053  2     ! copying the descriptor, then we want to release the memory we
;  930          1054  2     ! have allocated so far, so that it does not get lost forever.
;  931          1055  2     !
;  932          1056  2     ENABLE
;  933          1057  2         COPY_DESC_HANDLER;
;  934          1058  2
;  935          1059  2     ! Default the fourth parameter to TRUE.
;  936          1060  2     ! Also initialize the pointer to the new descriptor header.
;  937          1061  2     !
;  938          1062  2     IF ACTUALCOUNT() LSS 4
;  939          1063  2     THEN
;  940          1064  2         PERM_FLAG = TRUE
;  941          1065  2     ELSE
;  942          1066  2         PERM_FLAG = .PARAM4;
;  943          1067  2     COPY_DESC_HEAD = 0;
;  944          1068  2
;  945          1069  2     ! Compute the number of bytes to allocate. Always allocate
;  946          1070  2     ! at least 16 + base size of value descriptor.
;  947          1071  2     !
;  948          1072  2     LENGTH = .DESC[DBG$W_DHDR_LENGTH];
;  949          1073  2     IF .LENGTH LSS 16 + 4*DBG$K_VALDESC_BASE_SIZE
;  950          1074  2     THEN
;  951          1075  2         LENGTH = 16 + 4*DBG$K_VALDESC_BASE_SIZE;
;  952          1076  2
;  953          1077  2     CASE .DESC [DBG$B_DHDR_TYPE] FROM DBG$K_LITERAL TO DBG$K_V_VALUE_DESC OF
;  954          1078  2         SET
;  955          1079  2
;  956          1080  2         ! Ordinary value descriptors. These have the actual value embedded
;  957          1081  2         ! inside them. Copy the descriptor and fix up the pointer field
;  958          1082  2         ! so it points to the right place.
;  959          1083  2         !
;  960          1084  2         [DBG$K_VALUE_DESC]:
;  961          1085  2             BEGIN
;  962          1086  2             MAP
;  963          1087  2                 DESC: REF DBG$VALDESC;  ! Pointer to a new style value
;  964          1088  2                                         !     descriptor (the original)
;  965          1089  2             LOCAL
;  966          1090  2                 DESC_COPY: REF DBG$VALDESC;     ! Pointer to a new style value
;  967          1091  2                                                 !     descriptor (the copy).
;  968          1092  2
;  969          1093  2             IF .PERM_FLAG
;  970          1094  2             THEN
;  971          1095  2                 DESC_COPY = DBG$GET_MEMORY ((3+.LENGTH)/4)
;  972          1096  2             ELSE
;  973          1097  2                 DESC_COPY = DBG$GET_TEMPMEM ((3+.LENGTH)/4);
;  974          1098  2             CH$MOVE (.DESC[DBG$W_DHDR_LENGTH], .DESC, .DESC_COPY);
;  975          1099  2             DESC_COPY [DBG$L_VALUE_POINTER] = DESC_COPY [DBG$A_VALUE_ADDRESS];
```

```
;  976          1100  3            .PARAM2 = .DESC_COPY;
;  977          1101  2            END;
;  978          1102  2
;  979          1103  2        ! Volatile value descriptors. These point to a region of user
;  980          1104  2        ! memory containing the value. We do the same as above except
;  981          1105  2        ! that we do not fix up the pointer field.
;  982          1106  2        !
;  983          1107  2        [DBG$K_V_VALUE_DESC]:
;  984          1108  2            BEGIN
;  985          1109  2            MAP
;  986          1110  2                DESC: REF DBG$VALDESC;  ! Pointer to a new style value
;  987          1111  2                                       !     descriptor (the original)
;  988          1112  2            LOCAL
;  989          1113  2                DESC_COPY: REF DBG$VALDESC;     ! Pointer to a new style value
;  990          1114  2                                                !     descriptor (the copy).
;  991          1115  2
;  992          1116  2            IF .PERM_FLAG
;  993          1117  2            THEN
;  994          1118  2                DESC_COPY = DBG$GET_MEMORY ((3+.LENGTH)/4)
;  995          1119  2            ELSE
;  996          1120  2                DESC_COPY = DBG$GET_TEMPMEM ((3+.LENGTH)/4);
;  997          1121  2            CH$MOVE (7,.DESC[DBG$W_DHDR_LENGTH], .DESC, .DESC_COPY);
;  998          1122  2            .PARAM2 = .DESC_COPY;
;  999          1123  2            END;
; 1000          1124  2
; 1001          1125  2        ! New style Primary Descriptors. Here we have to copy the root
; 1002          1126  2        ! node and all sub-nodes. Note that we have to do this carefully,
; 1003          1127  2        ! in such as way that at any time we call GET_MEMORY, we must
; 1004          1128  2        ! have a valid (though partially constructed) Primary. This is
; 1005          1129  2        ! in case GET_MEMORY signals a NOFREE error message - we want
; 1006          1130  2        ! to be able to release the storage we have allocated up
; 1007          1131  2        ! to the point of running out of memory.
; 1008          1132  2        !
; 1009          1133  2        [DBG$K_PRIMARY_DESC]:
; 1010          1134  2            BEGIN
; 1011          1135  2
; 1012          1136  2            MAP
; 1013          1137  2                DESC: REF DBG$PRIMARY;                  ! Pointer to the Primary
; 1014          1138  2                                                        !     Descriptor to
; 1015          1139  2                                                        !     be copied.
; 1016          1140  2            LOCAL
; 1017          1141  2                DESC_COPY : REF DBG$PRIMARY,            ! Pointer to the copy
; 1018          1142  2                                                        !     of the Primary
; 1019          1143  2                                                        !     Descriptor.
; 1020          1144  2                DIMCNT,
; 1021          1145  2                NEW_SUBNODE: REF DBG$PRIM_NODE,         ! Pointer to a copy of
; 1022          1146  2                                                        !     a subnode
; 1023          1147  2                NUMBLKS,
; 1024          1148  2                PREV_SUBNODE: REF DBG$PRIM_NODE,        ! Pointer to a copy of
; 1025          1149  2                                                        !     a subnode
; 1026          1150  2                SIZE,                                   ! Size of a subnode
; 1027          1151  2                SUBCNT,
; 1028          1152  2                SUBNODE: REF DBG$PRIM_NODE;             ! Pointer to the original
; 1029          1153  2                                                        !     subnode.
; 1030          1154  2
; 1031          1155  2        ! Allocate memory for a new root node and copy the
; 1032          1156  2        ! values into it. We will fix up forward and back
```

```
;  1033        1157  3          ! Links later.
;  1034        1158  3          !
;  1035        1159  3          IF .PERM_FLAG
;  1036        1160  3          THEN
;  1037        1161  4              BEGIN
;  1038        1162  4              DESC_COPY = DBG$GET_MEMORY (DBG$K_PRIMARY_SIZE);
;  1039        1163  4
;  1040        1164  4              ! Put a pointer to the Primary in this own variable so
;  1041        1165  4              ! COPY_DESC_HANDLER can later free up the storage.
;  1042        1166  4              !
;  1043        1167  4              COPY_DESC_HEAD = .DESC_COPY;
;  1044        1168  4              END
;  1045        1169  3          ELSE
;  1046        1170  3              DESC_COPY = DBG$GET_TEMPMEM (DBG$K_PRIMARY_SIZE);
;  1047        1171  3          CH$MOVE (4*DBG$K_PRIMARY_SIZE, .DESC, .DESC_COPY);
;  1048        1172  3
;  1049        1173  3          ! Fix up the forward and back links so we have a valid partially
;  1050        1174  3          ! constructed Primary - i.e., we do not want to leave them pointing
;  1051        1175  3          ! to the original Primary.
;  1052        1176  3          !
;  1053        1177  3          DESC_COPY[DBG$L_PRIM_FLINK] = DESC_COPY[DBG$L_PRIM_FLINK];
;  1054        1178  3          DESC_COPY[DBG$L_PRIM_BLINK] = DESC_COPY[DBG$L_PRIM_FLINK];
;  1055        1179  3
;  1056        1180  3          ! Loop through each of the subnodes.
;  1057        1181  3          !
;  1058        1182  3          SUBNODE = .DESC [DBG$L_PRIM_FLINK];
;  1059        1183  3          PREV_SUBNODE = 0;
;  1060        1184  3          WHILE .SUBNODE NEQ DESC[DBG$L_PRIM_FLINK] DO
;  1061        1185  4              BEGIN
;  1062        1186  4
;  1063        1187  4              ! Allocate space for the new subnode.
;  1064        1188  4              !
;  1065        1189  4              IF .SUBNODE [DBG$B_PNODE_FCODE] EQL RST$K_TYPE_ARRAY
;  1066        1190  4              THEN
;  1067        1191  5                  BEGIN
;  1068        1192  5                  ! Use larger of SUBCNT, DIMCNT.
;  1069        1193  5                  SUBCNT = .SUBNODE[DBG$B_PNARR_SUBCNT];
;  1070        1194  5                  DIMCNT = .SUBNODE[DBG$B_PNARR_DIMCNT];
;  1071        1195  5                  IF .SUBCNT GTR .DIMCNT
;  1072        1196  5                  THEN
;  1073        1197  5                      NUMBLKS = .SUBCNT
;  1074        1198  5                  ELSE
;  1075        1199  5                      NUMBLKS = .DIMCNT;
;  1076        1200  5                  SIZE = DBG$K_PRIM_SIZE_ARRAY +
;  1077        1201  5                          DBG$K_PRIM_SIZE_SUBS*.NUMBLKS;
;  1078        1202  5                  END
;  1079        1203  4              ELSE IF .SUBNODE [DBG$B_PNODE_FCODE] EQL RST$K_TYPE_RECORD
;  1080        1204  4              THEN
;  1081        1205  4                  SIZE = DBG$K_PRIM_SIZE_RECORD
;  1082        1206  4              ELSE IF .SUBNODE [DBG$B_PNODE_FCODE] EQL RST$K_TYPE_VARIANT
;  1083        1207  4              THEN
;  1084        1208  4                  SIZE = DBG$K_PRIM_SIZE_VARIANT
;  1085        1209  4              ELSE
;  1086        1210  4                  SIZE = DBG$K_PRIM_SIZE_NORMAL;
;  1087        1211  4              IF .PERM_FLAG
;  1088        1212  4              THEN
;  1089        1213  4                  NEW_SUBNODE = DBG$GET_MEMORY(.SIZE)
```

```
;  1090          1214  4                ELSE
;  1091          1215  4                    NEW_SUBNODE = DBG$GET_TEMPMEM(.SIZE);
;  1092          1216  4
;  1093          1217  4                ! Copy the values.
;  1094          1218  4                !
;  1095          1219  4                CH$MOVE (4*.SIZE, .SUBNODE, .NEW_SUBNODE);
;  1096          1220  4
;  1097          1221  5                IF .PERM_FLAG AND (.SUBNODE [DBG$B_PNODE_FCODE] EQL RST$K_TYPE_VARIANT)
;  1098          1222  4                THEN
;  1099          1223  4                    NEW_SUBNODE[DBG$V_PNVAR_VALID] = FALSE;
;  1100          1224  4
;  1101          1225  4                ! Fill in the forward and back links.
;  1102          1226  4                !
;  1103          1227  4                IF .PREV_SUBNODE EQL 0
;  1104          1228  4                THEN
;  1105          1229  5                    BEGIN
;  1106          1230  5                    DESC_COPY [DBG$L_PRIM_FLINK] = .NEW_SUBNODE;
;  1107          1231  5                    DESC_COPY [DBG$L_PRIM_BLINK] = .NEW_SUBNODE;
;  1108          1232  5                    NEW_SUBNODE [DBG$L_PNODE_FLINK] = DESC_COPY [DBG$A_PRIM_FLINK];
;  1109          1233  5                    NEW_SUBNODE [DBG$L_PNODE_BLINK] = DESC_COPY [DBG$A_PRIM_FLINK];
;  1110          1234  5                    END
;  1111          1235  4                ELSE
;  1112          1236  5                    BEGIN
;  1113          1237  5                    PREV_SUBNODE [DBG$L_PNODE_FLINK] = .NEW_SUBNODE;
;  1114          1238  5                    DESC_COPY [DBG$L_PRIM_BLINK] = .NEW_SUBNODE;
;  1115          1239  5                    NEW_SUBNODE [DBG$L_PNODE_FLINK] = DESC_COPY [DBG$A_PRIM_FLINK];
;  1116          1240  5                    NEW_SUBNODE [DBG$L_PNODE_BLINK] = .PREV_SUBNODE;
;  1117          1241  4                    END;
;  1118          1242  4                PREV_SUBNODE = .NEW_SUBNODE;
;  1119          1243  4                SUBNODE = .SUBNODE [DBG$L_PNODE_FLINK];
;  1120          1244  3                END;
;  1121          1245  3
;  1122          1246  3            .PARAM2 = .DESC_COPY;
;  1123          1247  2             END;
;  1124          1248  2
;  1125          1249  2         ! At implementation level 3, we do not expect any other kind
;  1126          1250  2         ! of descriptor.
;  1127          1251  2         !
;  1128          1252  2         [INRANGE, OUTRANGE]:
;  1129          1253  2             $DBG_ERROR ('DBGLANVEC\DBG$NCOPY_DESC');
;  1130          1254  2
;  1131          1255  2         TES;
;  1132          1256  2
;  1133          1257  2     ! The copying has been done. Return success.
;  1134          1258  2     !
;  1135          1259  2     RETURN STS$K_SUCCESS;
;  1136          1260  1     END;


                                                                .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

24  47  42  44  5C  43  45  56  4E  41  4C  47  42  44  18  00105 P.AAH:  .ASCII  <24>\DBGLANVEC\<92>\DBG$NCOPY_DESC\          ;
                    43  53  45  44  5F  59  50  4F  43  4E  00114                                                              ;
```

```
                                                        .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                                OFFC 00000      .ENTRY  DBG$NCOPY_DESC, Save R2,R3,R4,R5,R6,R7,R8,- ; 0986
                                                                R9,R10,R11
                                          5E    14   C2 00002        SUBL2   #20, SP
                                          6D  01A7   CF DE 00005      MOVAL   32$, (FP)                           1038
                                          04         6C 91 0000A      CMPB    (AP), #4                            1062
                                                     05 1E 0000D      BGEQU   1$
                                          6E         01 D0 0000F      MOVL    #1, PERM_FLAG                       1064
                                                     04 11 00012      BRB     2$
                                          6E      10 AC D0 00014 1$:  MOVL    PARAM4, PERM_FLAG                   1066
                                    00000000'     EF D4 00018 2$:   CLRL    COPY_DESC_HEAD                      1067
                                          5B    04 AC D0 0001E      MOVL    DESC, R11                           1072
                                          50       6B 3C 00022      MOVZWL  (R11), LENGTH
                                          30       50 D1 00025      CMPL    LENGTH, #48                         1073
                                                   03 18 00028      BGEQ    3$
                                          50       30 D0 0002A      MOVL    #48, LENGTH                         1075
                                    0B 78 8F     02 AB 8F 0002D 3$:  CASEB   2(R11), #120, #11                   1077
                              0018     002F   0085     0018  00033 4$:  .WORD   5$-4$,-
                              0018     0018   0018     0018  0003B       14$-4$,-
                              005A     0018   0018     0018  00043       6$-4$,-
                                                                        5$-4$,-
                                                                        5$-4$,-
                                                                        5$-4$,-
                                                                        5$-4$,-
                                                                        5$-4$,-
                                                                        5$-4$,-
                                                                        5$-4$,-
                                                                        9$-4$
                                    00000000'     EF 9F 0004B 5$:   PUSHAB  P.AAH                               1253
                                                  01 DD 00051       PUSHL   #1
                                          00028362 8F DD 00053      PUSHL   #164706
                                00000000G   00      03 FB 00059     CALLS   #3, LIB$SIGNAL
                                                    53 11 00060     BRB     13$
                                          50        03 C0 00062 6$:  ADDL2   #3, R0                              1095
                                          50        04 C6 00065     DIVL2   #4, R0
                                          0B        6E E9 00068     BLBC    PERM_FLAG, 7$                       1093
                                                    50 DD 0006B     PUSHL   R0                                  1095
                                00000000G   00      01 FB 0006D     CALLS   #1, DBG$GET_MEMORY
                                                    09 11 00074     BRB     8$
                                                    50 DD 00076 7$:  PUSHL   R0                                 1097
                                00000000G   00      01 FB 00078     CALLS   #1, DBG$GET_TEMPMEM
                                          56        50 D0 0007F 8$:  MOVL    R0, DESC_COPY
                                    66    6B        6B 28 00082     MOVC3   (R11), (R11), (DESC_COPY)           1098
                                      18  A6    20  A6 9E 00086     MOVAB   32(R6), 24(DESC_COPY)               1099
                                                    24 11 0008B     BRB     12$                                 1100
                                          50        03 C0 0008D 9$:  ADDL2   #3, R0                              1118
                                          50        04 C6 00090     DIVL2   #4, R0
                                          0B        6E E9 00093     BLBC    PERM_FLAG, 10$                      1116
                                                    50 DD 00096     PUSHL   R0                                  1118
                                00000000G   00      01 FB 00098     CALLS   #1, DBG$GET_MEMORY
                                                    09 11 0009F     BRB     11$
                                                    50 DD 000A1 10$:  PUSHL   R0                                1120
                                00000000G   00      01 FB 000A3     CALLS   #1, DBG$GET_TEMPMEM
                                          56        50 D0 000AA 11$:  MOVL    R0, DESC_COPY
                                    66    6B        6B 28 000AD     MOVC3   (R11), (R11), (DESC_COPY)           1121
```

```
                    08   BC            56  D0 000B1 12$:    MOVL    DESC_COPY, @PARAM2                      ; 1122
                                  00F4  31  000B5 13$:    BRW     31$                                     ; 1077
                         15           6E  E9 000B8 14$:    BLBC    PERM_FLAG, 15$                          ; 1159
                                      09  DD 000BB          PUSHL   #9                                      ; 1162
                00000000G 00          01  FB 000BD          CALLS   #1, DBG$GET_MEMORY
                         5A           50  D0 000C4          MOVL    R0, DESC_COPY
                00000000' EF          5A  D0 000C7          MOVL    DESC_COPY, COPY_DESC_HEAD               ; 1167
                                      0C  11 000CE          BRB     16$                                     ; 1159
                                      09  DD 000D0 15$:     PUSHL   #9                                      ; 1170
                00000000G 00          01  FB 000D2          CALLS   #1, DBG$GET_TEMPMEM
                         5A           50  D0 000D9          MOVL    R0, DESC_COPY
            6A           6B           24  28 000DC 16$:     MOVC3   #36, (R11), (DESC_COPY)                 ; 1171
                      08 AE     14     AA  9E 000E0          MOVAB   20(DESC_COPY), 8(SP)                    ; 1177
                      08 BE     08     AE  D0 000E5          MOVL    8(SP), @8(SP)
                      18 AA     08     AE  D0 000EA          MOVL    8(SP), 24(DESC_COPY)                    ; 1178
                         59     14     AB  D0 000EF          MOVL    20(R11), SUBNODE                        ; 1182
                                04     AE  D4 000F3          CLRL    PREV_SUBNODE                            ; 1183
                         50     14     AB  9E 000F6 17$:     MOVAB   20(R11), R0                             ; 1184
                         50           59  D1 000FA          CMPL    SUBNODE, R0
                                      03  12 000FD          BNEQ    18$
                                  00A6  31  000FF          BRW     30$
                         01     09     A9  91 00102 18$:     CMPB    9(SUBNODE), #1                          ; 1189
                                      25  12 00106          BNEQ    21$
                      0C AE     1F     A9  9A 00108          MOVZBL  31(SUBNODE), SUBCNT                     ; 1193
                      10 AE     1B     A9  9A 0010D          MOVZBL  27(SUBNODE), DIMCNT                     ; 1194
                      10 AE     0C     AE  D1 00112          CMPL    SUBCNT, DIMCNT                          ; 1195
                                      06  15 00117          BLEQ    19$
                         57     0C     AE  D0 00119          MOVL    SUBCNT, NUMBLKS                         ; 1197
                                      04  11 0011D          BRB     20$
                         57     10     AE  D0 0011F 19$:     MOVL    DIMCNT, NUMBLKS                         ; 1199
            50           57           05  C5 00123 20$:     MULL3   #5, NUMBLKS, R0                         ; 1201
                         56     0A     A0  9E 00127          MOVAB   10(R0), SIZE                            ; 1200
                                      19  11 0012B          BRB     24$                                     ; 1189
                         07     09     A9  91 0012D 21$:     CMPB    9(SUBNODE), #7                          ; 1203
                                      05  12 00131          BNEQ    22$
                         56           07  D0 00133          MOVL    #7, SIZE                                ; 1205
                                      0E  11 00136          BRB     24$
                         13     09     A9  91 00138 22$:     CMPB    9(SUBNODE), #19                         ; 1206
                                      05  12 0013C          BNEQ    23$
                         56           0A  D0 0013E          MOVL    #10, SIZE                               ; 1208
                                      03  11 00141          BRB     24$
                         56           06  D0 00143 23$:     MOVL    #6, SIZE                                ; 1210
                         0B           6E  E9 00146 24$:     BLBC    PERM_FLAG, 25$                          ; 1213
                                      56  DD 00149          PUSHL   SIZE
                00000000G 00          01  FB 0014B          CALLS   #1, DBG$GET_MEMORY
                                      09  11 00152          BRB     26$
                                      56  DD 00154 25$:     PUSHL   SIZE                                    ; 1215
                00000000G 00          01  FB 00156          CALLS   #1, DBG$GET_TEMPMEM
                         58           50  D0 0015D 26$:     MOVL    R0, NEW_SUBNODE
            50           56           02  78 00160          ASHL    #2, SIZE, R0                            ; 1219
            68           69           50  28 00164          MOVC3   R0, (SUBNODE), (NEW_SUBNODE)
                         0A           6E  E9 00168          BLBC    PERM_FLAG, 27$                          ; 1221
                         13     09     A9  91 0016B          CMPB    9(SUBNODE), #19
                                      04  12 0016F          BNEQ    27$
                      0A AB           10  8A 00171          BICB2   #16, 10(NEW_SUBNODE)                    ; 1223
                                04     AE  D5 00175 27$:     TSTL    PREV_SUBNODE                            ; 1227
                                      13  12 00178          BNEQ    28$
```

```
                08   BE            58   D0 0017A          MOVL    NEW_SUBNODE, @8(SP)                    ; 1230
                18   AA            58   D0 0017E          MOVL    NEW_SUBNODE, 24(DESC_COPY)             ; 1231
                     68      08    AE   D0 00182          MOVL    @8(SP), (NEW_SUBNODE)                  ; 1232
                04   A8      08    AE   D0 00186          MOVL    8(SP), 4(NEW_SUBNODE)                  ; 1233
                                   11   11 0018B          BRB     29$                                    ; 1227
                04   BE            58   D0 0018D 28$:     MOVL    NEW_SUBNODE, @PREV_SUBNODE             ; 1237
                18   AA            58   D0 00191          MOVL    NEW_SUBNODE, 24(DESC_COPY)             ; 1238
                     68      08    AE   D0 00195          MOVL    8(SP), (NEW_SUBNODE)                   ; 1239
                04   A8      04    AE   D0 00199          MOVL    PREV_SUBNODE, 4(NEW_SUBNODE)           ; 1240
                04   AE            58   D0 0019E 29$:     MOVL    NEW_SUBNODE, PREV_SUBNODE              ; 1242
                     59            69   D0 001A2          MOVL    (SUBNODE), SUBNODE                     ; 1243
                                FF4E   31 001A5          BRW     17$                                    ; 1184
                08   BC            5A   D0 001A8 30$:     MOVL    DESC_COPY, @PARAM2                     ; 1246
                     50            01   D0 001AC 31$:     MOVL    #1, R0                                 ; 1259
                                      04 001AF          RET                                            ; 1260
                                    0000 001B0 32$:     .WORD   Save nothing                           ; 1038
                                   7E   D4 001B2          CLRL    -(SP)                                  ;
                                   5E   DD 001B4          PUSHL   SP                                     ;
                          7E       04   AC 7D 001B6          MOVQ    4(AP), -(SP)                           ;
                0000V     CF            03   FB 001BA          CALLS   #3, COPY_DESC_HANDLER                  ;
                                      04 001BF          RET                                            ;

; Routine Size:  448 bytes,    Routine Base:  DBG$CODE + 0276
```

```
;  1138          1261  1 ROUTINE COPY_DESC_HANDLER (SIG, MECH) =
;  1139          1262  1 !
;  1140          1263  1 ! FUNCTION
;  1141          1264  1 !       This is the error hander for DBG$NCOPY_DESC. This routine is
;  1142          1265  1 !       responsible for freeing up the memory we have allocated so
;  1143          1266  1 !       far, if we get a NOFREE error message while copying the descriptor.
;  1144          1267  1 !
;  1145          1268  1 ! INPUTS
;  1146          1269  1 !       SIG     - Signal argument vector
;  1147          1270  1 !       MECH    - not used
;  1148          1271  1 !
;  1149          1272  1 ! IMPLICIT INPUT
;  1150          1273  1 !       COPY_DESC_HEAD - An own variable that points to the head of
;  1151          1274  1 !                        the descriptor copy.
;  1152          1275  1 !
;  1153          1276  1 ! OUTPUTS
;  1154          1277  1 !       This routine resignals the error.
;  1155          1278  1 !
;  1156          1279  2     BEGIN
;  1157          1280  2     MAP
;  1158          1281  2         SIG: REF VECTOR;
;  1159          1282  2
;  1160          1283  2     ! Only do something if the error is "no free storage" and if the own
;  1161          1284  2     ! variable COPY_DESC_HEAD is not zero (meaning that some storage has
;  1162          1285  2     ! been allocated before the NOFREE).
;  1163          1286  2     !
;  1164          1287  2     IF .SIG[1] EQL DBG$_NOFREE
;  1165          1288  2     THEN
;  1166          1289  2         IF .COPY_DESC_HEAD NEQ 0
;  1167          1290  2         THEN
;  1168          1291  2             BEGIN
;  1169          1292  2             DBG$NFREE_DESC(.COPY_DESC_HEAD);
;  1170          1293  2             COPY_DESC_HEAD = 0;
;  1171          1294  2             END;
;  1172          1295  2
;  1173          1296  2     ! Having freed the storage, resignal the error.
;  1174          1297  2     !
;  1175          1298  2     RETURN SS$_RESIGNAL;
;  1176          1299  1     END;


                                0004 00000 COPY_DESC_HANDLER:
                                           .WORD   Save R2                                 ;  1261
                52 00000000'    EF  9E 00002           MOVAB   COPY_DESC_HEAD, R2
                50        04    AC  D0 00009           MOVL    SIG, R0                  ;  1287
00028332        8F        04    A0  D1 0000D           CMPL    4(R0), #164658
                                0E  12 00015           BNEQ    1$
                50              62  D0 00017           MOVL    COPY_DESC_HEAD, R0       ;  1289
                                09  13 0001A           BEQL    1$
                                50  DD 0001C           PUSHL   R0                       ;  1292
            0000V   CF          01  FB 0001E           CALLS   #1, DBG$NFREE_DESC
                                62  D4 00023           CLRL    COPY_DESC_HEAD           ;  1293
                50      0918    8F  3C 00025 1$:       MOVZWL  #2328, R0                ;  1298
                                04  0002A             RET                              ;  1299
```

```
; Routine Size:  43 bytes,    Routine Base:  DBG$CODE + 0436
```

```
;  1178          1300  1 GLOBAL ROUTINE DBG$NFREE_DESC (DESC, PARAM2, PARAM3) =
;  1179          1301  1 !
;  1180          1302  1 !++
;  1181          1303  1 ! FUNCTIONAL DESCRIPTION:
;  1182          1304  1 !
;  1183          1305  1 !       Releases dynamic storage associated with a non-volatile copy of a
;  1184          1306  1 !       language specific value or primary descriptor.
;  1185          1307  1 !       This routine accepts as input a copy of a primary or value
;  1186          1308  1 !       descriptor produced by DBG$NCOPY_DESC and calls the
;  1187          1309  1 !       routine DBG$REL_MEMORY to release each block of non-listed dynamic
;  1188          1310  1 !       storage contained within the descriptor.
;  1189          1311  1 !
;  1190          1312  1 !       This routine calls a language-specific routine based on the
;  1191          1313  1 !       language code in the descriptor header.
;  1192          1314  1 !
;  1193          1315  1 ! FORMAL PARAMETERS:
;  1194          1316  1 !
;  1195          1317  1 !       desc                    - The address of a non-volatile primary or
;  1196          1318  1 !                                 value descriptor
;  1197          1319  1 !
;  1198          1320  1 !       param2                  - The address of a longword to contain the address
;  1199          1321  1 !                                 of a message argument vector for errors
;  1200          1322  1 !
;  1201          1323  1 ! IMPLICIT INPUTS:
;  1202          1324  1 !
;  1203          1325  1 !       NONE
;  1204          1326  1 !
;  1205          1327  1 ! IMPLICIT OUTPUTS:
;  1206          1328  1 !
;  1207          1329  1 !       On failure, a message argument vector.
;  1208          1330  1 !
;  1209          1331  1 ! ROUTINE VALUE:
;  1210          1332  1 !
;  1211          1333  1 !       An unsigned integer longword completion code
;  1212          1334  1 !
;  1213          1335  1 ! COMPLETION CODES:
;  1214          1336  1 !
;  1215          1337  1 !       STS$K_SUCCESS   (1)     - Success. Storage for  descriptor released.
;  1216          1338  1 !
;  1217          1339  1 !       STS$K_SEVERE    (4)     - Failure. Storage for descriptor not released. Message
;  1218          1340  1 !                                 argument vector constructed and returned.
;  1219          1341  1 !
;  1220          1342  1 ! SIDE EFFECTS:
;  1221          1343  1 !
;  1222          1344  1 !       Dynamic memory is returned to the free storage pool.
;  1223          1345  1 !
;  1224          1346  1 !--
;  1225          1347  2     BEGIN
;  1226          1348  2     MAP
;  1227          1349  2         DESC: REF DBG$VALDESC;
;  1228          1350  2
;  1229          1351  2     ! Handle value descriptors separately from primary descriptors.
;  1230          1352  2     !
;  1231          1353  2     SELECTONE .DESC [DBG$B_DHDR_TYPE] OF
;  1232          1354  2         SET
;  1233          1355  2
;  1234          1356  2         ! Ordinary value descriptors. These are allocated in one contiguous
```

```
;  1235          1357  2          ! block so we can just release that block.
;  1236          1358  2          !
;  1237          1359  2          [DBG$K_VALUE_DESC, DBG$K_V_VALUE_DESC]:
;  1238          1360  3              BEGIN
;  1239          1361  3              DBG$REL_MEMORY (.DESC);
;  1240          1362  2              END;
;  1241          1363  2
;  1242          1364  2          ! New style Primary Descriptors. Here we have to release storage
;  1243          1365  2          ! for the root node and all the subnodes.
;  1244          1366  2          !
;  1245          1367  2          [DBG$K_PRIMARY_DESC]:
;  1246          1368  3              BEGIN
;  1247          1369  3              MAP
;  1248          1370  3                  DESC: REF DBG$PRIMARY;                  ! Pointer to the Primary
;  1249          1371  3                                                          !     Descriptor for which
;  1250          1372  3                                                          !     a symid list is to
;  1251          1373  3                                                          !     be constructed.
;  1252          1374  3              LOCAL
;  1253          1375  3                  NEW_SUBNODE,                            ! Pointer to the next
;  1254          1376  3                                                          !    subnode
;  1255          1377  3                  SAVED_PTR,                              ! Position in root node
;  1256          1378  3                                                          !    that is pointed to
;  1257          1379  3                                                          !    by the flink in the
;  1258          1380  3                                                          !    last subnode.
;  1259          1381  3                  SUBNODE: REF DBG$PRIM_NODE;             ! Pointer to a subnode.
;  1260          1382  3
;  1261          1383  3              ! First save away a pointer to the subnode and a pointer
;  1262          1384  3              ! which will identify when we have looped through all the
;  1263          1385  3              ! subnodes. Then release the storage associated with the
;  1264          1386  3              ! root node.
;  1265          1387  3              !
;  1266          1388  3              SAVED_PTR = DESC [DBG$L_PRIM_FLINK];
;  1267          1389  3              SUBNODE = .DESC [DBG$L_PRIM_FLINK];
;  1268          1390  3              DBG$REL_MEMORY (.DESC);
;  1269          1391  3
;  1270          1392  3              ! Loop through the subnodes. After saving a pointer to the
;  1271          1393  3              ! next subnode, release the storage for the current subnode.
;  1272          1394  3              !
;  1273          1395  3              WHILE .SUBNODE NEQ .SAVED_PTR DO
;  1274          1396  4                  BEGIN
;  1275          1397  4                  NEW_SUBNODE = .SUBNODE [DBG$L_PNODE_FLINK];
;  1276          1398  4                  DBG$REL_MEMORY (.SUBNODE);
;  1277          1399  4                  SUBNODE = .NEW_SUBNODE;
;  1278          1400  3                  END;
;  1279          1401  2              END;
;  1280          1402  2
;  1281          1403  2          ! At implementation level 3, we do not expect any other kind
;  1282          1404  2          ! of descriptor.
;  1283          1405  2          !
;  1284          1406  2          [OTHERWISE]:
;  1285          1407  2              $DBG_ERROR ('DBGLANVEC\DBG$NFREE_DESC');
;  1286          1408  2
;  1287          1409  2          TES;
;  1288          1410  2
;  1289          1411  2      ! The storage has been freed. Return success.
;  1290          1412  2      !
;  1291          1413  2      RETURN STS$K_SUCCESS;
```

```
; 1292          1414  1     END;


                                                        .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

24 47 42 44 5C 43 45 56 4E 41 4C 47 42 44  18  0011E P.AAI:  .ASCII  <24>\DBGLANVEC\<92>\DBG$NFREE_DESC\
                  43 53 45 44 5F 45 45 52 46 4E    0012D

                                                        .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                          003C 00000        .ENTRY  DBG$NFREE_DESC, Save R2,R3,R4,R5                ; 1300
                    55 00000000G      00   9E 00002        MOVAB   DBG$REL_MEMORY, R5
                    52          04    AC   D0 00009        MOVL    DESC, R2                                        ; 1353
                    50          02    A2   9A 0000D        MOVZBL  2(R2), R0
                 7A 8F                50   91 00011        CMPB    R0, #122                                        ; 1359
                                      06   13 00015        BEQL    1$
                 83 8F                50   91 00017        CMPB    R0, #131
                                      07   12 00018        BNEQ    2$
                                      52   DD 0001D 1$:     PUSHL   R2                                              ; 1361
                    65                01   FB 0001F        CALLS   #1, DBG$REL_MEMORY
                                      3A   11 00022        BRB     5$                                              ; 1353
                 79 8F                50   91 00024 2$:     CMPB    R0, #121                                        ; 1367
                                      1F   12 00028        BNEQ    4$
                    54          14    A2   9E 0002A        MOVAB   20(R2), SAVED_PTR                               ; 1388
                    53          14    A2   D0 0002E        MOVL    20(R2), SUBNODE                                 ; 1389
                                      52   DD 00032        PUSHL   R2                                              ; 1390
                    65                01   FB 00034        CALLS   #1, DBG$REL_MEMORY
                    54                53   D1 00037 3$:     CMPL    SUBNODE, SAVED_PTR                              ; 1395
                                      22   13 0003A        BEQL    5$
                    52                63   D0 0003C        MOVL    (SUBNODE), NEW_SUBNODE                          ; 1397
                                      53   DD 0003F        PUSHL   SUBNODE                                         ; 1398
                    65                01   FB 00041        CALLS   #1, DBG$REL_MEMORY
                    53                52   D0 00044        MOVL    NEW_SUBNODE, SUBNODE                            ; 1399
                                      EE   11 00047        BRB     3$                                              ; 1395
                          00000000'   EF   9F 00049 4$:     PUSHAB  P.AAI                                           ; 1407
                                      01   DD 0004F        PUSHL   #1
                          00028362    8F   DD 00051        PUSHL   #164706
                00000000G 00          03   FB 00057        CALLS   #3, LIB$SIGNAL
                    50                01   D0 0005E 5$:     MOVL    #1, R0                                          ; 1413
                                      04   00061        RET                                                     ; 1414

; Routine Size:  98 bytes,    Routine Base:  DBG$CODE + 0461
```

```
;  1294     1415  1 GLOBAL ROUTINE DBG$NGET_SYMID (DESC, PARAM2, PARAM3) =
;  1295     1416  1 !
;  1296     1417  1 !++
;  1297     1418  1 !
;  1298     1419  1 !  FUNCTIONAL DESCRIPTION:
;  1299     1420  1 !
;  1300     1421  1 !       Returns a list of symids contained within a language specific primary
;  1301     1422  1 !       or value descriptor.
;  1302     1423  1 !
;  1303     1424  1 !       This routine calls a language-specific routine based on the language
;  1304     1425  1 !       code in the descriptor header.
;  1305     1426  1 !
;  1306     1427  1 !  FORMAL PARAMETERS:
;  1307     1428  1 !
;  1308     1429  1 !       desc            - A longword containing the address of a language specific
;  1309     1430  1 !                         primary or value descriptor.
;  1310     1431  1 !
;  1311     1432  1 !       param2          - The address of a longword to contain the address of
;  1312     1433  1 !                         the first node in the symid list. Each node in the
;  1313     1434  1 !                         consists of a two longword block. The first longword
;  1314     1435  1 !                         is the link field and contains the address of the
;  1315     1436  1 !                         next node in the list. This field is 0 for the last
;  1316     1437  1 !                         node in the list. The second longword contains the
;  1317     1438  1 !                         value of a symid. Each symid that appears in a
;  1318     1439  1 !                         descriptor should appear once and only once in the
;  1319     1440  1 !                         symid list.
;  1320     1441  1 !
;  1321     1442  1 !       param3          - The address of a longword to contain the address of
;  1322     1443  1 !                         a message argument vector as described on page 4-119
;  1323     1444  1 !                         of the VAX/VMS system reference, volume 1A
;  1324     1445  1 !
;  1325     1446  1 !  IMPLICIT INPUTS:
;  1326     1447  1 !
;  1327     1448  1 !       NONE
;  1328     1449  1 !
;  1329     1450  1 !  IMPLICIT OUTPUTS:
;  1330     1451  1 !
;  1331     1452  1 !       In case of a severe error return, a message argument vector is constructed
;  1332     1453  1 !       from dynamic storage and returned.
;  1333     1454  1 !
;  1334     1455  1 !  ROUTINE VALUE:
;  1335     1456  1 !
;  1336     1457  1 !       An unsigned integer longword completion code
;  1337     1458  1 !
;  1338     1459  1 !  COMPLETION CODES:
;  1339     1460  1 !
;  1340     1461  1 !       STS$K_SUCCESS (1) - Success. Symid list constructed and returned.
;  1341     1462  1 !
;  1342     1463  1 !       STS$K_SEVERE  (4) - Failure. No symid list returned. Message argument
;  1343     1464  1 !                           vector constructed and returned.
;  1344     1465  1 !
;  1345     1466  1 !  SIDE EFFECTS:
;  1346     1467  1 !
;  1347     1468  1 !       NONE
;  1348     1469  1 !
;  1349     1470  1 !--
;  1350     1471  2     BEGIN
;  1351     1472  2     MAP
;  1352     1473  2         DESC: REF DBG$VALDESC;
;  1353     1474  2     LOCAL
```

```
;  1351     1472  2          DIMCNT,
;  1352     1473  2          NUMBLKS,
;  1353     1474  2          SUBCNT,
;  1354     1475  2          SYMID_LIST;                         ! Pointer to the head of
;  1355     1476  2                                              !    the symid list.
;  1356     1477  2
;  1357     1478  2      ! Implementation level 3 - all languages at this level have common
;  1358     1479  2      ! descriptors so we construct the symid list here.
;  1359     1480  2      !
;  1360     1481  2
;  1361     1482  2          ROUTINE APPEND_TO_LIST (SYMID, SYMID_LIST) : NOVALUE =
;  1362     1483  2          !
;  1363     1484  2          ! FUNCTION
;  1364     1485  2          !       This subroutine is used below to append a new symid
;  1365     1486  2          !       to the symid list under construction.
;  1366     1487  2          !
;  1367     1488  2          ! INPUTS
;  1368     1489  2          !       SYMID -         The symid to be added to the list.
;  1369     1490  2          !       SYMID_LIST -    Points to a longword containing a pointer
;  1370     1491  2          !                       to the head of the symid list.
;  1371     1492  2          !
;  1372     1493  2          ! OUTPUTS
;  1373     1494  2          !       If the symid list was empty, a one-node list will be
;  1374     1495  2          !       created and the SYMID_LIST parameter will contain
;  1375     1496  2          !       a pointer to this one-node list.
;  1376     1497  2          !       Otherwise, the SYMID_LIST parameter is left unchanged
;  1377     1498  2          !       but a node may be added to the list it points to.
;  1378     1499  2          !
;  1379     1500  3              BEGIN
;  1380     1501  3              LOCAL
;  1381     1502  3                  LINK_NODE: REF DBG$LINK_NODE,   ! Pointer to a node in the
;  1382     1503  3                                                  !    symid list.
;  1383     1504  3                  PREV_NODE: REF DBG$LINK_NODE;   ! Pointer to a node in the
;  1384     1505  3                                                  !    symid list.
;  1385     1506  3
;  1386     1507  3              ! If the symid is zero, do not add it to the list.
;  1387     1508  3              !
;  1388     1509  3              IF .SYMID EQL 0 THEN RETURN;
;  1389     1510  3
;  1390     1511  3              ! First check whether the given symid is on the list already.
;  1391     1512  3              !
;  1392     1513  3              LINK_NODE = ..SYMID_LIST;
;  1393     1514  3              PREV_NODE = .SYMID_LIST;
;  1394     1515  3              WHILE .LINK_NODE NEQ 0 DO
;  1395     1516  4                  BEGIN
;  1396     1517  4                  IF .LINK_NODE [DBG$L_LINK_NODE_VALUE] EQL .SYMID
;  1397     1518  4                  THEN
;  1398     1519  4                      RETURN;
;  1399     1520  4                  PREV_NODE = .LINK_NODE;
;  1400     1521  4                  LINK_NODE = .LINK_NODE [DBG$L_LINK_NODE_LINK];
;  1401     1522  3                  END;
;  1402     1523  3
;  1403     1524  3
;  1404     1525  3              ! Allocate space for a new node and put it on the list.
;  1405     1526  3              !
;  1406     1527  3              LINK_NODE = DBG$GET_TEMPMEM (DBG$K_LINK_NODE_SIZE);
;  1407     1528  3              PREV_NODE [DBG$L_LINK_NODE_LINK] = .LINK_NODE;
```

```
;  1408          1529  3              LINK_NODE [DBG$L_LINK_NODE_VALUE] = .SYMID;
;  1409          1530  2              END;


                                                000C 00000 APPEND_TO_LIST:
                                                           .WORD   Save R2,R3                                  ;  1482
                                    52      04  AC  D0 00002          MOVL    SYMID, R2                      ;  1509
                                                2A  13 00006          BEQL    3$
                                    50      08  BC  D0 00008          MOVL    @SYMID_LIST, LINK_NODE         ;  1513
                                    53      08  AC  D0 0000C          MOVL    SYMID_LIST, PREV_NODE          ;  1514
                                                50  D5 00010 1$:      TSTL    LINK_NODE                      ;  1515
                                                0E  13 00012          BEQL    2$
                                    52      04  A0  D1 00014          CMPL    4(LINK_NODE), R2               ;  1517
                                                18  13 00018          BEQL    3$
                                    53          50  D0 0001A          MOVL    LINK_NODE, PREV_NODE           ;  1520
                                    50          60  D0 0001D          MOVL    (LINK_NODE), LINK_NODE         ;  1521
                                                EE  11 00020          BRB     1$                             ;  1515
                                                02  DD 00022 2$:      PUSHL   #2                             ;  1527
                          00000000G 00          01  FB 00024          CALLS   #1, DBG$GET_TEMPMEM
                                    63          50  D0 0002B          MOVL    LINK_NODE, @PREV_NODE)         ;  1528
                              04    A0          52  D0 0002E          MOVL    R2, 4(LINK_NODE)               ;  1529
                                                04  00032 3$:        RET                                    ;  1530

;  Routine Size:  51 bytes,    Routine Base:  DBG$CODE + 04C3

;  1410          1531  2
;  1411          1532  2          ! Initialize the pointer to the symid list.
;  1412          1533  2          !
;  1413          1534  2          SYMID_LIST = 0;
;  1414          1535  2
;  1415          1536  2          ! Handle value descriptors separately from primary descriptors.
;  1416          1537  2          !
;  1417          1538  2          SELECTONE .DESC [DBG$B_DHDR_TYPE] OF
;  1418          1539  2              SET
;  1419          1540  2
;  1420          1541  2              ! Ordinary value descriptors.
;  1421          1542  2              !
;  1422          1543  2              [DBG$K_VALUE_DESC, DBG$K_V_VALUE_DESC]:
;  1423          1544  3                  BEGIN
;  1424          1545  3                  MAP
;  1425          1546  3                      DESC: REF DBG$VALDESC;  ! Pointer to a new style value
;  1426          1547  3                                              !     descriptor
;  1427          1548  3                  APPEND_TO_LIST (.DESC [DBG$L_DHDR_TYPEID], SYMID_LIST);
;  1428          1549  3                  APPEND_TO_LIST (.DESC [DBG$L_DHDR_SYMID0], SYMID_LIST);
;  1429          1550  2                  END;
;  1430          1551  2
;  1431          1552  2              ! New style Primary Descriptors. Here we have to get symids from
;  1432          1553  2              ! the root node and all sub-nodes.
;  1433          1554  2              !
;  1434          1555  2              [DBG$K_PRIMARY_DESC]:
;  1435          1556  3                  BEGIN
;  1436          1557  3
;  1437          1558  3                  MAP
```

```
;  1438          1559  3          DESC: REF DBG$PRIMARY;                  ! Pointer to the Primary
;  1439          1560  3                                                  !     Descriptor for which
;  1440          1561  3                                                  !     a symid list is to
;  1441          1562  3                                                  !     be constructed.
;  1442          1563  3
;  1443          1564  3      LOCAL
;  1444          1565  3          SUBNODE: REF DBG$PRIM_NODE;             ! Pointer to a subnode.
;  1445          1566  3
;  1446          1567  3      ! Append the typeid and the symid from the root node.
;  1447          1568  3      !
;  1448          1569  3      APPEND_TO_LIST (.DESC [DBG$L_DHDR_TYPEID], SYMID_LIST);
;  1449          1570  3      APPEND_TO_LIST (.DESC [DBG$L_DHDR_SYMID0], SYMID_LIST);
;  1450          1571  3
;  1451          1572  3      ! Loop through each of the subnodes.
;  1452          1573  3      !
;  1453          1574  3      SUBNODE = .DESC [DBG$L_PRIM_FLINK];
;  1454          1575  3      WHILE .SUBNODE NEQ DESC[DBG$L_PRIM_FLINK] DO
;  1455          1576  4          BEGIN
;  1456          1577  4
;  1457          1578  4          ! All kinds of subnodes have typeids and symids
;  1458          1579  4          ! so we append these.
;  1459          1580  4          !
;  1460          1581  4          APPEND_TO_LIST (.SUBNODE [DBG$L_PNODE_TYPEID], SYMID_LIST);
;  1461          1582  4          APPEND_TO_LIST (.SUBNODE [DBG$L_PNODE_SYMID], SYMID_LIST);
;  1462          1583  4
;  1463          1584  4          ! If the subnode is an array node then it also
;  1464          1585  4          ! has typeids in the subscript vector.
;  1465          1586  4          !
;  1466          1587  4          IF .SUBNODE [DBG$B_PNODE_FCODE] EQL RST$K_TYPE_ARRAY
;  1467          1588  4          THEN
;  1468          1589  5              BEGIN
;  1469          1590  5              LOCAL
;  1470          1591  5                  SUBVECTOR: REF DBG$PRIM_NODE_SUBS;
;  1471          1592  5              APPEND_TO_LIST (.SUBNODE [DBG$L_PNARR_CELLTYPE],SYMID_LIST);
;  1472          1593  5              SUBVECTOR = SUBNODE [DBG$A_PNARR_SVECTOR];
;  1473          1594  5              ! Use whichever is larger, subcnt or dimcnt.
;  1474          1595  5              SUBCNT = .SUBNODE[DBG$B_PNARR_SUBCNT];
;  1475          1596  5              DIMCNT = .SUBNODE[DBG$B_PNARR_DIMCNT];
;  1476          1597  5              IF .SUBCNT GTR .DIMCNT
;  1477          1598  5              THEN
;  1478          1599  5                  NUMBLKS = .SUBCNT
;  1479          1600  5              ELSE
;  1480          1601  5                  NUMBLKS = .DIMCNT;
;  1481          1602  5              INCR I FROM 0 TO .NUMBLKS-1 DO
;  1482          1603  5                  APPEND_TO_LIST (.SUBVECTOR[.I, DBG$L_PNSUB_TYPEID],
;  1483          1604  5                                  SYMID_LIST);
;  1484          1605  5              END
;  1485          1606  4          ELSE IF .SUBNODE [DBG$B_PNODE_FCODE] EQL RST$K_TYPE_VARIANT
;  1486          1607  4          THEN
;  1487          1608  4              APPEND_TO_LIST(.SUBNODE[DBG$L_PNVAR_TAGID],SYMID_LIST);
;  1488          1609  4
;  1489          1610  4          SUBNODE = .SUBNODE [DBG$L_PNODE_FLINK];
;  1490          1611  3          END;
;  1491          1612  2      END;
;  1492          1613  2
;  1493          1614  2  ! At implementation level 3, we do not expect any other kind
;  1494          1615  2  ! of descriptor.
```

```
;  1495          1616  2          !
;  1496          1617  2          [OTHERWISE]:
;  1497          1618  2              $DBG_ERROR ('DBGLANVEC\DBG$NGET_SYMID');
;  1498          1619  2
;  1499          1620  2          TES;
;  1500          1621  2
;  1501          1622  2      ! The symid list has been constructed. Return success.
;  1502          1623  2      !
;  1503          1624  2      .PARAM2 = .SYMID_LIST;
;  1504          1625  2      RETURN STS$K_SUCCESS;
;  1505          1626  1      END;


                                                                .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

24 47 42 44 5C 43 45 56 4E 41 4C 47 42 44 18  00137 P.AAJ:   .ASCII  <24>\DBGLANVEC\<92>\DBG$NGET_SYMID\          ;
                  44 49 4D 59 53 5F 54 45 47 4E  00146                                                          ;


                                                                .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                        03FC 00000              .ENTRY  DBG$NGET_SYMID, Save R2,R3,R4,R5,R6,R7,R8,- ; 1415
                                                                R9                                                  ;
                              59        C8   AF  9E 00002       MOVAB   APPEND_TO_LIST, R9                          ;
                                             7E  D4 00006       CLRL    SYMID_LIST                                  ; 1534
                              55        04   AC  D0 00008       MOVL    DESC, R5                                    ; 1538
                        7A    8F        02   A5  91 0000C       CMPB    2(R5), #122                                 ; 1543
                                             07  13 00011       BEQL    1$                                          ;
                        83    8F        02   A5  91 00013       CMPB    2(R5), #131                                 ;
                                             13  12 00018       BNEQ    2$                                          ;
                                             5E  DD 0001A 1$:    PUSHL   SP                                          ; 1548
                                        08   A5  DD 0001C       PUSHL   8(R5)                                       ;
                              69             02  FB 0001F       CALLS   #2, APPEND_TO_LIST                          ;
                                             5E  DD 00022       PUSHL   SP                                          ; 1549
                                        0C   A5  DD 00024       PUSHL   12(R5)                                      ;
                              69             02  FB 00027       CALLS   #2, APPEND_TO_LIST                          ;
                                       00A0  31  00002A        BRW     12$                                         ; 1538
                        79    8F        02   A5  91 0002D 2$:  CMPB    2(R5), #121                                 ; 1555
                                             03  13 00032       BEQL    3$                                          ;
                                       0081  31  00034        BRW     11$                                         ;
                                             5E  DD 00037 3$:    PUSHL   SP                                          ; 1569
                                        08   A5  DD 00039       PUSHL   8(R5)                                       ;
                              69             02  FB 0003C       CALLS   #2, APPEND_TO_LIST                          ;
                                             5E  DD 0003F       PUSHL   SP                                          ; 1570
                                        0C   A5  DD 00041       PUSHL   12(R5)                                      ;
                              69             02  FB 00044       CALLS   #2, APPEND_TO_LIST                          ;
                              52        14   A5  D0 00047       MOVL    20(R5), SUBNODE                             ; 1574
                              50        14   A5  9E 0004B 4$:   MOVAB   20(R5), R0                                 ; 1575
                              50             52  D1 0004F       CMPL    SUBNODE, R0                                 ;
                                             79  13 00052       BEQL    12$                                         ;
                                             5E  DD 00054       PUSHL   SP                                          ; 1581
                                        0C   A2  DD 00056       PUSHL   12(SUBNODE)                                 ;
                              69             02  FB 00059       CALLS   #2, APPEND_TO_LIST                          ;
                                             5E  DD 0005C       PUSHL   SP                                          ; 1582
                                        10   A2  DD 0005E       PUSHL   16(SUBNODE)                                 ;
```

```
                69          02  FB 00061          CALLS   #2, APPEND_TO_LIST                    ;
                01    09    A2  91 00064          CMPB    9(SUBNODE), #T                       ; 1587
                      3B    12  00068          BNEQ    9$                                   ;
                      5E    DD  0006A          PUSHL   SP                                   ; 1592
                24    A2    DD  0006C          PUSHL   36(SUBNODE)                          ;
                49          02  FB 0006F          CALLS   #2, APPEND_TO_LIST                   ;
                53    28    A2  9E 00072          MOVAB   40(R2), SUBVECTOR                    ; 1593
                56    1F    A2  9A 00076          MOVZBL  31(SUBNODE), SUBCNT                  ; 1595
                58    1B    A2  9A 0007A          MOVZBL  27(SUBNODE), DIMCNT                  ; 1596
                58          56  D1 0007E          CMPL    SUBCNT, DIMCNT                       ; 1597
                            05  15 00081          BLEQ    5$                                   ;
                57          56  D0 00083          MOVL    SUBCNT, NUMBLKS                      ; 1599
                            03  11 00086          BRB     6$                                   ;
                57          58  D0 00088  5$:     MOVL    DIMCNT, NUMBLKS                      ; 1601
                54          01  CE 0008B  6$:     MNEGL   #1, I                                ; 1603
                            0F  11 0008E          BRB     8$                                   ;
                            5E  DD 00090  7$:     PUSHL   SP                                   ;
          50    54          14  C5 00092          MULL3   #20, I, R0                           ;
                      10 A043   9F 00096          PUSHAB  16(R0)[SUBVECTOR]                    ;
                            9E  DD 0009A          PUSHL   @(SP)+                               ;
                69          02  FB 0009C          CALLS   #2, APPEND_TO_LIST                   ;
          ED    54          57  F2 0009F  8$:     AOBLSS  NUMBLKS, I, 7$                       ;
                            0E  11 000A3          BRB     10$                                  ; 1587
                13    09    A2  91 000A5  9$:     CMPB    9(SUBNODE), #19                      ; 1606
                            08  12 000A9          BNEQ    10$                                  ;
                            5E  DD 000AB          PUSHL   SP                                   ; 1608
                1C          A2  DD 000AD          PUSHL   28(SUBNODE)                          ;
                69          02  FB 000B0          CALLS   #2, APPEND_TO_LIST                   ;
                52          62  D0 000B3  10$:     MOVL    (SUBNODE), SUBNODE                   ; 1610
                            93  11 000B6          BRB     4$                                   ; 1575
          00000000'         EF  9F 000B8  11$:     PUSHAB  P.AAJ                                ; 1618
                            01  DD 000BE          PUSHL   #1                                   ;
                00028362    8F  DD 000C0          PUSHL   #164706                              ;
    00000000G   00          03  FB 000C6          CALLS   #3, LIB$SIGNAL                       ;
          08    BC          6E  D0 000CD  12$:     MOVL    SYMID_LIST, @PARAM2                  ; 1624
                50          01  D0 000D1          MOVL    #1, R0                               ; 1625
                                04 000D4          RET                                          ; 1626

; Routine Size:  213 bytes,    Routine Base:  DBG$CODE + 04F6
```

```
;  1507          1627  1 GLOBAL ROUTINE DBG$NINITIALIZE : NOVALUE =
;  1508          1628  1 !
;  1509          1629  1 !  FUNCTION
;  1510          1630  1 !        This routine calls language specific initialization routines.  This is
;  1511          1631  1 !        done before each command is processed to garuantee the integrity of the
;  1512          1632  1 !        language specific machinery.
;  1513          1633  1 !
;  1514          1634  1 !  FORMAL PARAMETERS:
;  1515          1635  1 !
;  1516          1636  1 !        NONE
;  1517          1637  1 !
;  1518          1638  1 !  IMPLICIT INPUTS:
;  1519          1639  1 !
;  1520          1640  1 !        NONE
;  1521          1641  1 !
;  1522          1642  1 !  IMPLICIT OUTPUTS:
;  1523          1643  1 !
;  1524          1644  1 !        NONE
;  1525          1645  1 !
;  1526          1646  1 !  ROUTINE VALUE:
;  1527          1647  1 !
;  1528          1648  1 !        NOVALUE
;  1529          1649  1 !
;  1530          1650  1 !  COMPLETION CODES:
;  1531          1651  1 !
;  1532          1652  1 !        NONE
;  1533          1653  1 !
;  1534          1654  1 !  SIDE EFFECTS:
;  1535          1655  1 !
;  1536          1656  1 !        NONE
;  1537          1657  1 !
;  1538          1658  2     BEGIN
;  1539          1659  2     RETURN;
;  1540          1660  1     END;


                                                0000 00000          .ENTRY  DBG$NINITIALIZE, Save nothing                ; 1627
                                                  04 00002          RET                                                  ; 1660

; Routine Size:  3 bytes,    Routine Base:  DBG$CODE + 05CB

;  1541          1661  0 END ELUDOM


                                                                    .EXTRN  LIB$SIGNAL

;                                    PSECT SUMMARY
;
;       Name                    Bytes                           Attributes
;
;  DBG$OWN                          4  NOVEC,  WRT,  RD ,NOEXE,NOSHR,  LCL,  REL,  CON,  PIC,ALIGN(2)
```

```
;  DBG$PLIT                        336  NOVEC,NOWRT,  RD ,  EXE,  SHR,  LCL,  REL,  CON,  PIC,ALIGN(0)
;  DBG$CODE                       1486  NOVEC,NOWRT,  RD ,  EXE,  SHR,  LCL,  REL,  CON,  PIC,ALIGN(0)

;
;                                Library Statistics
;
;                                        --------- Symbols ---------      Pages       Processing
;       File                             Total    Loaded   Percent      Mapped       Time
;
;  _$255$DUA28:[SYSLIB]LIB.L32;1          18619         6         0        1000       00:01.9
;  _$255$DUA28:[DEBUG.OBJ]STRUCDEF.L32;1     32         0         0           7       00:00.1
;  _$255$DUA28:[DEBUG.OBJ]DBGLIB.L32;1     1545       110         7          97       00:02.0
;  _$255$DUA28:[DEBUG.OBJ]DSTRECRDS.L32;1
;                                           418         3         0          31       00:00.3
;  _$255$DUA28:[DEBUG.OBJ]DBGMSG.L32;1      386         2         0          22       00:00.3




;                                COMMAND QUALIFIERS

;       BLISS/CHECK=(FIELD,INITIAL,OPTIMIZE)/LIS=LIS$:DBGLANVEC/OBJ=OBJ$:DBGLANVEC MSRC$:DBGLANVEC/UPDATE=(ENH$:DBGLANVEC)

; Size:         1486 code + 340 data bytes
; Run Time:       00:32.0
; Elapsed Time:   01:49.9
; Lines/CPU Min:   3116
; Lexemes/CPU-Min: 11001
; Memory Used:  181 pages
; Compilation Complete
```

DBGIFTHEN
LIS

DBGLANVEC
LIS

DBGLANGOP
LIS

DBGGEN
LIS

DBGLEVEL1
LIS